DURHAM COLLEGE
SUCCESS MATTERS

Understanding Transfer Experience in the Skilled Trades

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ABSTRACT

The shortage of skilled trades workers in Ontario has led to a renewed focus on enabling access to skilled trades education through related postsecondary enrolment and apprenticeship training. The construction sector has been especially impacted by the shortage of trained skilled tradespersons and was the focus of this research project.

The key purpose of this research project was the collation and organization of longitudinal datasets to support skilled trades research in Ontario. These datasets were prepared and explored in order to determine whether there are any trends and patterns associated with students enrolled in a skilled trades programs, particularly those related to the construction sector.

The analysis confirmed a widely perceived notion that interest in construction related skilled trades programs is prevalent among the young, domestic, male population. The research study, however, also found evidence that older students in skilled trades programs, particularly those with prior postsecondary experience, were likely to have higher academic performance in the first semester than their younger peer group. The study also found evidence of a need for continued supports for female students in skilled trades programs. The research additionally identified the significant opportunity to promote skilled trades education to international students to help address the skilled trades labour shortage in the Province and contribute to the economy.

The research study explored potential antecedent academic pathways for students enrolling in skilled trades programs, and identified key informational barriers to executing further research in the area. The limited investigation did, however, indicate the potential for pathways among certain programs in the Technology occupational cluster to skilled trades programs. While the study was able to successfully identify the predictors of academic success for students in skilled trades programs, further research with more information on related pathways is required to model the academic performance variance more fully.

This exploratory research represents the first phase of a research project that will inform recommendations to strengthen skilled trades education in Ontario's construction sector. The next phase of research is recommended to examine the interconnections between postsecondary skilled trades programs and the Ontario apprenticeship training system within the construction sector, including student interest in apprenticeship training programs, pathways into apprenticeships for the graduates of skilled trades postsecondary programs, the relative success of students enrolling in apprenticeship training after a postsecondary experience, and the employment outcomes for graduates of skilled trades postsecondary programs.

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INTRODUCTION

PURPOSE OF THE STUDY

The shortage of skilled trades workers in Ontario has led to a renewed focus on enabling access to skilled trades education through related postsecondary programs and apprenticeship training. The construction sector has been particularly impacted by the shortage of trained skilled tradespersons and is the focus of this research.

Currently, there is very little research available on student mobility in construction related postsecondary programs in Ontario. This study provides a preliminary but in-depth exploration of demographic profiles, student mobility and academic success factors for Construction Related (CR) postsecondary programs and a comparative analysis with the postsecondary Non-Construction Related (NCR) programs.

RESEARCH QUESTIONS

POSTSECONDARY STUDENT INTEREST IN CONSTRUCTION SECTOR PROGRAMS

1. What is the overall profile of a student in a construction program, and have there been demographic changes in recent years?
2. What is the educational history of postsecondary students pursuing additional qualifications in the construction sector?

TRANSFER EXPERIENCE

3. What proportion of students enrolling in construction programs utilize credit transferred from a different institution?
4. What are the pathways students leverage to gain access to a construction program?

STUDENT OUTCOMES

5. Are there differences in the semester one grade point averages of students with prior education in a postsecondary skilled trades program as compared to those who do not have prior postsecondary experience?
6. Are the completion rates different for the students with partial postsecondary experience as compared to students who do not have a previous experience?
7. What, if anything, suggests an increased likelihood of enrolling in a skilled trades program as a subsequent enrolment?
8. Are there certain graduation predictors for students enrolled in skilled trades programs? Construction programs?

DEFINITIONS OF KEY TERMS

The following is a list of key terms used throughout this report:

- CAAT: Colleges of Applied Arts and Technology (*referred to as 'college'*)
- MCU: Ministry of Colleges and Universities
- OCAS: Ontario College Application Service
- ONCAT: Ontario Council on Articulation and Transfer
- OUAC: Ontario Universities' Application Centre
- PSE: Postsecondary Experience

SUMMARY OF KEY FINDINGS

DEMOGRAPHIC OPPORTUNITIES

Durham College (DC) students enrolled in construction related skilled trades programs are predominantly domestic, male and younger than students enrolled in other programs. There is a significant opportunity to increase representation of female and other underrepresented populations in these programs. While there is an increasing awareness of the need for female participation, most of the diversity efforts remain focused on recruitment. The results of the study indicate higher first semester academic performance by male students in the skilled trades programs, and hence potential opportunities to provide greater support to female students in skilled trades education.

This research study also provides the first assessment of the particularly small proportion of international students enrolled in the skilled trades programs at DC. Given that the study results empirically demonstrate the high academic performance of international students in skilled trades programs, and the skilled trades labour shortage impacting Ontario, it is critical that greater concerted efforts be made in international recruitment campaigns to make international students aware of the education and career opportunities in this field.

PRIOR POSTSECONDARY EDUCATION: PATHWAYS AND IMPACT

A small proportion of students enrolled in Skilled Trades CR programs have prior postsecondary experience, and very few students utilize credit transfer opportunities. However, these students with prior postsecondary experience demonstrate higher academic performance than their peer group that does not have prior postsecondary experience.

In particular, students who are currently enrolled in the programs affiliated with the Technology occupational cluster may find subsequent interest in skilled trades programs, and leverage their common prior learning through credit transfers.

LIMITATIONS OF THE STUDY

INVESTIGATION OF STUDENT POPULATION LIMITED TO SINGLE INSTITUTION

DC was an appropriate choice for this study as it has a wide range of programs and is established in the area of skilled trades. However, as a single site study, findings can only be used to guide further research rather than draw broader conclusions. It is also important to note that DC does not offer all of the skilled trades programs available in the publicly-funded college system.

LIMITED AVAILABILITY OF PRIOR POSTSECONDARY EDUCATION DATA AT NON-CAAT INSTITUTIONS IN ONTARIO OR AT POSTSECONDARY INSTITUTIONS OUTSIDE OF ONTARIO

In order to assess prior postsecondary education, this study relied on data from the Ontario College Application Service (OCAS), which provides services to Ontario's publicly-funded colleges. There is no secondary data available to provide a comprehensive history of enrolment at universities, career colleges, international institutions and colleges in other provinces/territories.

LIMITED AVAILABILITY OF SELECT SOCIO-DEMOGRAPHIC DATA

This study limited reporting on socio-demographics for which data is reliable and consistently available (e.g., age, gender and residency status). While there was interest in exploring other socio-demographics such as Indigenous identification, the data was unavailable. Additionally, the gender analysis relied on data that includes only the categories 'male', 'female' and 'unknown'.

LIMITED ABILITY TO IDENTIFY HIGH AFFINITY PROGRAMS FOR SKILLED TRADES PROGRAM PATHWAYS DUE TO DEPLOYMENT OF CREDIT TRANSFER FLAG AS A PERMANENT ATTRIBUTE ON STUDENT RECORD

The indicator signifying a student has been granted credit toward the completion of a program (i.e., CT flag) is assigned to the student record for the duration of their studies at DC, even if they enroll in multiple programs. As a result, the presence of a CT flag does not necessarily indicate that prior education was in a related field of study for the program.

UNAVAILABILITY OF GRADUATION/COMPLETION RECORDS FOR PRIOR POSTSECONDARY EXPERIENCE

This study was successful in collating validated information on the DC skilled trades students' prior postsecondary education enrolment at Ontario colleges, but unfortunately, information was not available on whether the students completed and graduated from these prior postsecondary programs. Thus, analysis on the graduation rates was not feasible. The research study, however, did assess student academic success outcome by collating and examining the student performance for first semester GPA which is a strong predictor of eventual student graduation.

LITERATURE REVIEW

DEFINING SKILLED TRADES

Skilled trades are occupations that require hands-on work and specialized skills, knowledge or abilities (Government of Ontario, 2021a). Skilled trades are found in both the goods-producing and services-producing sectors of the economy, and are generally categorized as construction, transportation/motive power, manufacturing/industrial or service (Canadian Apprenticeship Forum, n.d.).[1]

In Canada, skilled trades are classified as either compulsory or voluntary. Compulsory trades require individuals to be registered as an apprentice, journeyperson candidate or journeyperson in order to work in the trade. Apprenticeship training and certification is also available for voluntary trades, but is not legally required for employment (Ontario College of Trades, 2020).

There are more than 300 officially recognized skilled trades in Canada, but they are not all designated (i.e., apprenticeable occupations) in every province and territory. Additionally, classifications of trades as compulsory or voluntary vary across the country. Each province and territory holds responsibility for legislating, regulating and monitoring its training and employment requirements for skilled trades (Lefebvre, et al. 2012). For instance, there are currently 144 designated trades in Ontario, 23 of which are designated compulsory, meaning it is illegal to practice without proper certification. Conversely, in British Columbia there are currently no compulsory trades.[2]

Canada also has an Interprovincial Red Seal Program, which allows tradespersons who have successfully passed the Red Seal examination to have their certification recognized nationally. The Red Seal is designated for 55 skilled trades, and is considered a national standard of excellence indicating that a journeyperson has met a common standard of knowledge and experience in their trade (Canadian Apprenticeship Forum, n.d.).

EDUCATIONAL PATHWAYS INTO SKILLED TRADES IN ONTARIO

APPRENTICESHIP

In Ontario, apprenticeship training is largely recognized as a key pathway for gaining the requisite skills and knowledge to work in the skilled trades. Apprenticeship is a form of education that combines classroom-based training with paid, on-the-job training. In

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[1] See *Appendix A* for descriptions of the four main Skilled Trades sectors.

[2] There have been recent efforts by the Ministry of Advanced Education and Skills Training (2021) to introduce certification requirements for specific trades.

Ontario, the apprenticeship system falls under the purview of the Ministry of Labour, Training and Skills Development, and requires the participation of a sponsor (employer) and an approved Training Delivery Agent (TDA) (Chatoor & Kaufman, 2020). The Ministry determines how many apprenticeship seats are allocated to each TDA.

Ontario's apprenticeships involve approximately 20 per cent of in-class training and 80 per cent of on-the-job training, and are typically two to five years in length (Chatoor & Kaufman, 2020). When an apprentice has completed all elements of the apprenticeship, they receive a Certificate of Apprenticeship (C of A) and are referred to as a journeyperson candidate. This certificate allows them to pursue a Certificate of Qualification (C of Q). For many trades, this requires the apprentice to pass a certification exam, which is typically a multiple-choice test and requires a minimum of 70 per cent to pass. Once a C of Q is obtained, the title of journeyperson is applied (Chatoor & Kaufman, 2020).

The process of registering as an apprentice requires finding an employer who is prepared to participate in an apprenticeship agreement. Individuals must be at least 16 years of age and legally able to work in Ontario. Many employers hire individuals first as a labourer, and enter into an apprenticeship agreement after they have proven to be capable and responsible. A registered training agreement is a contract between the apprentice, sponsor and provincial apprenticeship authority (Government of Ontario, n.d.).

Apprenticeship in Ontario was regulated by the Ministry of Colleges and Universities (MCU) under the *Trades Qualification and Apprenticeship Act, 1990* (TQAA) and the *Apprenticeship and Certification Act, 1998* (ACA), until the *Ontario College of Trades and Apprenticeship Act, 2009* was introduced. The Ontario College of Trades (OCOT) was officially established in 2013 to oversee apprenticeship programs, set training standards, investigate infractions and conduct trades-related research (Ontario College of Trades, 2020).

In 2013, the Ontario Chamber of Commerce (OCC) released a review of Ontario's apprenticeship system and advocated for "a complete overhaul of the provincial approach to regulating the skilled trades" (Holmes & Hjartarson, 2013, p. 3). The OCC's report is particularly critical of the journeyperson-to-apprentice ratio in Ontario, which was among the highest in Canada at the time. The report argues that a high ratio is restrictive for small-and-medium-sized businesses, and discourages their participation in the apprenticeship system. This sentiment is echoed in a C.D. Howe Institute commentary by Brydon and Dachis (2013). Their analysis found that "a high ratio reduces entry into the labour force and contributes to a shortage of skilled labour in that trade" (Bryden & Dachis, 2013, p. 10).

In response to calls for improvements to the Ontario skilled trades and apprenticeship system, the government is winding down the OCOT and replacing it with a new Crown agency, Skilled Trades Ontario. A remodeling of the system was initiated through *Bill*

47, Making Ontario Open for Business Act, 2018, which includes a reduction of journeymen to apprentice ratios to 1:1 (Government of Ontario, 2021b).

More recently, the new *Skilled Trades Act* (2021) has been established with the intent to implement a system that is more efficient and easier to navigate, including "a simplified pathway for apprentice registration, issuance of certificates and renewals and equivalency assessments" (Wall, 2021). Skilled Trades Ontario will also work to help end the stigma around careers in construction, as well as conduct research into the skilled trades and apprenticeships so that the Province and employers will be able to anticipate future needs (Wall, 2021).

PRE-APPRENTICESHIP PROGRAMS

Pre-Apprenticeship Programs are available in Ontario to help individuals gain the skills and experience they need to find work as an apprentice. These programs are funded by the Government of Ontario and are free of cost to participants. Pre-Apprenticeship Programs are offered by different organizations including colleges and other TDAs, are typically 40 weeks in duration, and usually include safety training, level-1 apprenticeship in-class training, and work placements (Ontario Ministry of Training, Colleges and Universities, 2015).

SECONDARY SCHOOL OPPORTUNITIES

Throughout Canada, there are various high school initiatives that introduce students to the skilled trades and provide early training. In Ontario, the Ontario Youth Apprenticeship Program (OYAP) allows students to explore a career in the skilled trades and gain credits towards postsecondary education. Similarly, Specialist High Skills Major (SHSM) programs allow students to customize their secondary school education to suit their interests. SHSMs are available for a variety of sectors, including construction. Students complete their major through a series of courses (8-10) and workplace experience (Government of Ontario, 2015).

POSTSECONDARY PROGRAMS

Although apprenticeships are recognized as a key pathway into the skilled trades, the 2006 Census shows that only a small proportion (approximately 17 per cent) of workers in these occupations completed a registered apprenticeship program (Crocker, 2011). A similar proportion hold other forms of trades certificates, including those earned through postsecondary education.

In Ontario, certificate and diploma programs in skilled trades are offered by public and private colleges. These programs include both theory and practical hands-on training, and prepare graduates to enter the workforce or pursue an apprenticeship. Upon completion of some trades-related programs, graduates may be eligible for exemption of the in-school training portion for the respective trade.

Tradespeople in Ontario who have not followed the apprenticeship pathway can still obtain a C of Q through a trades equivalency assessment (TEA). The TEA process allows individuals with equivalent qualifications and experience in a trade to challenge the certification examination. This can include tradespeople in international skilled trades, and apprentices or journeypersons from other Canadian jurisdictions (Government of Ontario, 2021a).

SKILLED TRADES EDUCATIONAL PATHWAYS AND LABOUR MARKET OUTCOMES

The impact of education on the labour market outcomes of tradespeople has been explored in several Canadian studies (Ahmed, 2010; Chatoor & Kaufman, 2020; Frank & Jovic 2017; Ménard, Chan & Walker, 2008; Laporte & Mueller, 2012). For instance, Frank and Jovic (2017) provide a national overview of the data generated from the 2015 National Apprenticeship Survey (NAS). One of the key findings of the survey is that apprentices who completed their programs were more likely to find employment (Frank & Jovic, 2017).

More recently (2021), Finnie, Dubois and Miyairi released a comprehensive report on the earnings of Red Seal apprentices using the Education and Labour Market Longitudinal Platform (ELMLP). Their findings are similar to those of Frank and Jovic (2017), in that those who complete apprenticeships earn approximately 9 to 10 per cent more than trade qualifiers (i.e., those who have on-the-job training and received a C of Q). Finnie, Dubois and Miyairi also compared the earnings of journeypersons to postsecondary education graduates and found that men with trade certificates earn significantly more than men with bachelor's degrees and college-level certificates or diplomas in the first year of work. However, the same is not true for women, who earn far less with trade certification (Finnie, Dubois & Miyairi, 2021).

Research on labour market outcomes in the skilled trades has primarily focused on comparing the outcomes of those who have completed an apprenticeship program to those who started an apprenticeship but discontinued. However, some research assesses labour market outcomes based on other pathways into the skilled trades (Gunderson & Krashinsky, 2012; Crocker, 2011; Boothby & Dewes, 2010; Statistics Canada, 2017a).

Gunderson and Krashinsky (2012) found that males in construction and mechanical trades with an apprenticeship certificate earned 15 per cent more than those in the trades who were not apprenticed. Like Finnie, Dubois and Miyairi's 2021 report, Gunderson and Krashinsky (2012) found the situation is vastly different for females, who earn even less than females who have only completed high school. A study by Boothby and Drewes (2010) came to similar conclusions.

There are limitations to these studies, stemming from the use of 2006 Census data, which does not identify those with postsecondary qualifications in addition to apprenticeship. A 2009 report by the Canadian Apprenticeship Forum (CAF) used a

different combination of data sources (e.g., Labour Force Survey and 2007 National Apprenticeship Survey) to compare the labour market outcomes of trades program completers and graduates of select trades/technical college, but the study did not include Ontario (Crocker et al., 2014).

In recognition of limited research in this area, the Canadian Council of Directors of Apprenticeship (CCDA) commissioned a research plan to develop "a more comprehensive understanding of the relationship between apprenticeship completion, certification and outcomes" (Crocker, Pepin, Hurrell, Wald, Wiebe, Wong & Ahmed, 2014, p.1). A key focus of this research includes "examining differences in these outcomes among those who enter the trades through apprenticeship versus other routes, those who complete their programs and those who either discontinue or remain in the program for much longer than the nominal time required to complete" (Crocker, et al. 2014, p.1). Among other findings, the study confirmed there is an income advantage for tradespeople with a C of Q earned through apprenticeship or trade qualification, and an additional income advantage for those who complete apprenticeships (Crocker, et al. 2014).

SKILLED TRADES WORKFORCE

DEMOGRAPHIC PROFILE

It is estimated that 22.1 per cent of employed Canadians worked in skilled trades occupations in 2015 (Frank & Jovic, 2017). As a whole, the skilled trades workforce is distributed throughout the provinces and territories proportional to the overall population, but there are differences among the individual trades. For instance, Alberta, which accounts for approximately 12 per cent of Canada's labour force, employs 20 per cent of the country's plumbers, pipefitters, and gas fitters (Statistics Canada, 2016).

The aging population is posing a challenge for Canada's workforce overall, and the skilled trades are not an exception. In Ontario, 21 per cent of residents will be older than 64 by 2029, and youth aged 15 to 24 will account for less than 10 per cent of the population (Dijkema, 2018). BuildForce Canada, a construction labour market organization, believes the skilled trades will be particularly impacted by this shift in demographics because of the cumbersome and lengthy apprenticeship training system (BuildForce Canada, 2020a). The average age of an apprentice in Ontario in 2012 was 29.9 years and over one-quarter of certified journeyperson were 55 and older in 2019 (Statistics Canada, 2020a).

However, Lefebrve, Simonova and Wang argue that "gauging the age structure of skilled trades would best be done by examining the situation of specific trade in a particular province" (p.24). For instance, plumbers, pipefitters and gas fitters have a relatively young age structure, while machinists and related occupations, heavy equipment operators and machinery and transportation equipment mechanics have a high proportion of workers close to retirement (Lefebrve, et al., 2012).

Similarly, the highest level of education completed before apprenticeship differs significantly among the individual skilled trades. In their 2020 study, Chatoor and Kaufman used 2015 NAS data to explore the apprenticeship system in Ontario. They found that it is common for apprentices to have already completed as postsecondary credential before starting their apprenticeship. In the service trades, 45 per cent of apprentices had a prior postsecondary credential, and the same was true for 24.4 per cent of apprentices in construction (Chatoor & Kaufman, 2020). This finding was also highlighted in a 2018 Canadian Apprenticeship Forum report by Arrowsmith, in which she indicates “most apprentices work first or pursue another form of postsecondary education prior to securing an apprenticeship opportunity” (Arrowsmith, 2018).

The underrepresentation of females in the skilled trades is commonly identified as an issue in skilled trades literature (Barnetson, 2018; Frank & Frenette, 2019; Frank & Jovic, 2017; Laryea & Medu, 2010). The gender mix is highly unbalanced, with males accounting for over 90 per cent of all trades workers in 2011 (Frank & Frenette, 2019). Similarly, females represent only 13.7 per cent of apprentices in Canada (ibid.). This imbalance is even more acute in specific regions and trades. For instance, in Ontario’s construction industry, females comprise only 3.8 per cent of workers. Females who do work in the trades are largely concentrated in the services industry in trades such as hairstylist and esthetician (Frank & Frenette, 2019)

Recent immigrants are also identified as an underrepresented group in skilled trades. According to the 2007 Labour Force Survey (LFS), 17 per cent of workers in the trades were immigrants, which is significantly lower than the 21 per cent of workers that are immigrants in the non-trades occupations. Similarly, immigrants account for only 8.7 per cent of apprentices, which is less than half of their share of the population of Canada (Frank & Jovic, 2017).

On the other hand, Indigenous Canadians account for a larger proportion of apprentices as compared to their general population representation in Canada (6 per cent vs 4 per cent) (Arrowsmith 2018; BuildForce Canada 2021; Frank & Jovic 2017).

LABOUR SUPPLY AND DEMAND

It is widely perceived that there is a disconnect between the supply and demand of the skilled trades labour force. A prevalent opinion in the literature is that there is a looming shortage of skilled tradespeople that is largely due to Canada’s aging population (Dijkema, 2018; Carey, 2014; Pyper, 2008; Haan, et al., 2020; Stuckey & Munro, 2013; Spence, 2012). In Canada, more than 700,000 workers in the skilled trades are expected to retire by 2028 (Government of Canada, 2021).

According to BuildForce Canada, the construction and maintenance sector in Ontario will be particularly impacted, and will need to hire, train and retain 100,000 additional workers over the next decade to keep pace with demands (2021). This gap will stem from an anticipated record number of retirements that will coincide with new

infrastructure projects, including public transportation and two nuclear refurbishment projects in the Greater Toronto Area and southwestern Ontario (BuildForce Canada, 2020b).

The Canadian Apprenticeship Forum (2021) echoes this sentiment and estimates there will be a gap of 60,000 registered apprentices in Canada by 2025. However, research led by Pepin for the CCDA emphasizes that the multiple pathways into the trades must be considered when assessing the potential for a labour shortage. The researchers argue that the "LFS and Census are most likely to underrepresent the extent and contribution of Canadians with trades and apprenticeship background since they do not identify those who are uncertified but have some trades and apprenticeship training while working in related jobs; or those who have trades and apprenticeship certificates along with higher education levels" (Crocker et al., 2014, p 222). They call for future research to focus on the link between education and occupation.

Similarly, Lefebvre, Simonova and Wang (2012) explain that "a labour shortage speaks to the insufficient number of people available in a given occupation to satisfy employers' labour demand" (p.11). Their report highlights the difficulty of directly observing and measuring labour shortages. They are critical of government policy response that focuses on resolving labour shortages rather than ensuring that effective stabilizing mechanisms are in place.

Ontario released an *Apprenticeship Strategy* in 2018 which aims to improve the apprenticeship system and respond to the needs of the economy and workforce (Government of Ontario, 2018). Key to the *Apprenticeship Strategy* is increasing participation of underrepresented groups. The opportunity to increase diversity within the skilled trades is prevalent in the literature (Frank & Frenette, 2019; Ericksen& Palladino-Schultheiss, 2009; Greene & Stitt-Gohdes, 1997). Women, Indigenous peoples, recent immigrants, racialized Canadians, youth, and persons with disabilities are often recognized as an untapped source of skilled trades labour, and increasing their participation is seen as key to meeting labour demands (Canadian Apprenticeship Forum, 2004).

Promoting the skilled trades as a viable career option is also a key objective of the 2018 *Apprenticeship Strategy*. The Ontario government recognizes that the skilled trades are typically not encouraged within the current education system, which emphasizes academic and high-vocation skills (The Conference Board of Canada, 2002). Research suggests there is an implicit bias against the trades among parents and students, which serves as a barrier to apprenticeship participation (Sharpe & Gibson, 2005; Schuetze, 2003; Taylor, 2003; Canadian Apprenticeship Forum, 2005; Deussing, 2015; Gallagher & Kitching, 2003; Jean-Louis, 2017).

A poll by the Canadian Apprenticeship Forum and Skills Canada in 2005 set out to "identify the awareness, attitudes and perception of youth and their influences towards skilled trades and apprenticeship throughout Canada" (Canadian Apprenticeship Forum,

2005, p.1). The study confirmed that stereotypes are prevalent about skilled trades among Canadian youth, including that skilled trades are only suited to males, and that tradespeople are not well respected in society. These perceptions act as a barrier to increasing youth participation in skilled trades. A similar study in 2015 found a more positive perception of jobs in the trades, but still limited interest in pursuing skilled trades as a career (Deussing, 2015).

More recently in 2021, Green, Melnick and Pariser prepared a report for the Ministry of Labour, Training and Skills Development on "increasing the engagement of young people in the skilled trades and addressing the stigma and barriers associated with pursuing a career in the skilled trades" (p.1.). This report was informed by consultations with multiple stakeholders, including youth, apprentices and employers. Key among their findings is a lack of clear information about apprenticeship pathways that discourages youth from pursuing the skilled trades. The report also emphasizes the importance of addressing the poor perception of skilled trades. One suggestion from stakeholders is the reclassification of apprenticeship to be more in line with postsecondary nomenclature (e.g., Skilled Trades Diploma of Qualification) (Green, et al., 2021).

In their 2005 report on the apprenticeship system in Canada, Sharpe and Gibson also argue that the apprenticeship system should be "integrated into the postsecondary system to improve the potential advancement of apprentices and the flexibility of their credentials" (p.11). MCU has recently approved a process that allows colleges to grant apprentices with an Ontario College Certificate upon the successful completion of their apprenticeship training. This initiative enables the Province's economic recovery from the pandemic by supporting awareness of the skilled trades, and contributes to the efforts to modernize the apprenticeship system.

There is also a body of literature that calls for the adoption of a 'competency-based approach' to trades training and credentialing as a means of increasing labour supply (Lane & Griffiths, 2015; Drummond & Kachuck Rosenbluth, 2015; Dijkema, 2018). Lane and Griffiths (2015) argue that a competency-based model in which "people are credentialed for specific competencies and can stack these credentials together to qualify for different trades" (p.2), is advantageous to tradespeople, employers and the economy as a whole. This type of system is more efficient and cost-effective, and allows for labour mobility geographically and between trades.

A "focus on competencies and graduated credentials" was also included in policy recommendations by Dijkema to the Ontario government in 2018 (p.1.). This recommendation was integrated into the *Modernizing the Skilled Trades and Apprenticeship Act, 2019*, which introduces a framework based on "portable skill sets" (Government of Ontario, 2019). This new framework is under development, but proposes a system in which apprentices and journeypersons can work in a variety of industries or trades, and will allow employers to train apprentices with exactly the skills they need for the jobs they have available.

APPRENTICESHIP COMPLETION RATES

Despite the strong demand for tradespeople, the number of new registrations in apprenticeship programs is decreasing in Canada. There are differences throughout the country, with Ontario experiencing a slight increase in new registrations from 2018 to 2019 (1.9 per cent), compared to a national decline of 2.9 per cent (Statistics Canada, 2021). There are also differences among the trades, with the construction industry seeing the strongest growth in registrations. In Ontario, new registrations in construction related apprenticeship programs reached a five-year high in 2019 (Statistics Canada, 2020a).

However, the COVID-19 pandemic had a significant impact on new registrations in 2020, with a decline of 29 per cent from the year prior (Statistics Canada, 2021). The decline was even more significant in Ontario (37 per cent). There are some signs of recovery in 2021, but numbers remain well below 2019 (Statistics Canada, 2020a). The Canadian Apprenticeship Forum's 2021 National Labour Market Information Report suggests future research will need to assess the impact of the pandemic on the labour supply of tradespeople (Canadian Apprenticeship Forum, 2021).

Apprenticeship registrations alone do not provide a fulsome picture of the supply of certified tradespeople. Despite the well-documented benefits of obtaining certification, only about half of Canadian apprentices complete their programs (Government of Canada, 2014). Furthermore, most apprentices take longer than the usual program duration to earn their certificate.

Apprenticeship programs range in duration from two years to five years, depending on the trades itself and the jurisdiction. However, less than one-fifth of apprentices in Canada complete their training within the designated time period (Statistics Canada, 2020b). In a 2010 study, Cadieux used 2007 NAS data to explore the time to completion in apprenticeship programs. He found that having prior technical training in the trades contributes to shorter completion time of an apprenticeship. However, Cadieux also found that taking part in a high school apprenticeship initiative actually leads to longer completion times (Cadieux, 2010).

Completion rates (i.e., the proportion of apprentices that successfully complete their apprenticeship program) for apprentices have also been explored from a variety of perspectives, including comparing completion rates for different trades (Desjardins & Paquin, 2010; Arrowmsith, 2018), and exploring factors associated with completion rates (Arrowsmith, 2017; Campbell, 2010; Dostie 2010; Haan, et al., 2020; Laporte & Mueller 2011; Lane & Griffiths, 2015). In their 2020 Canadian study, Jin, Langevin, Lebel and Haan found that "apprentices who were credited for previous work experience or training were more likely to complete their program" (Haan, et al., 2020, p.1). The same study found that apprentices registered in compulsory trades were less likely to be discontinuers (Haan, et al., 2020).

In his report “Overcoming Skills Shortage in Canada”, Carey (2014) argues that low completion rates contribute to the skilled trades labour shortage because it limits the number of journeypersons who can train other apprentices. In examining reasons for low completion rates, Carey cites multiple studies (Akyeampong, 1991, Laporte & Mueller, 2012) that highlight the labour market penalties for non-completion, including lower wages as compared to completers. Carey identifies multiple barriers to completion, including financial burdens due to un-paid periods of in-class training, fragmented inter-provincial apprenticeship programming, and inadequate numeracy and literacy skills (Carey, 2014).

DATA AND METHODS

DATA SOURCES AND PROJECT DATASETS

The study population is comprised of postsecondary students who were enrolled in DC full-time during any of the Fall semesters from 2016 to 2020.

The data for the study population was collated from three key sources:

COLLEGE STRATEGIC ENROLMENT REPORTING – DC CSER DATASET

The College Statistical Enrolment Reporting (CSER) file contains records of enrolment for full-time postsecondary students. CSER files are formally audited and submitted by colleges to MCU for funding purposes. The CSER file is prepared and submitted once each semester (November 1, March 1, and June 30). These files contain demographic and program information for each student, such as date of birth, gender, country of citizenship, postal code, program of study, MCU code and credential type. Student enrolments included on the CSER files for the reporting period (Fall 2016 to Fall 2020) were consolidated to create the base dataset of the study population, referred to as **DC CSER** in this study.

The DC CSER dataset is a compilation of full-time postsecondary students enrolled at DC in the Fall semesters over the 2016 to 2020 period. It is important to note that the students included in the DC CSER dataset:

- are unique for any given semester; but
- may be repeated between the semesters if they are re-enrolled at DC in a subsequent Fall semester between 2017 and 2020 because they progressed to a subsequent year of study, repeated a year of study, or re-enrolled in a different program.

This ensures that the student population can be investigated for any unique attributes, as well as tracked as a cohort to examine longitudinal trends. In addition, the DC CSER dataset includes demographic variables such as program of study, credential, occupational cluster associated with the program of study, year of study, gender, and residency status.

STUDENT INFORMATION SYSTEM (SIS) – DC OCAS DATASET

Durham's College's Student Information System (SIS) is the centralized repository of formal records and information for all the students enrolled at DC at any given time. The SIS contains the official records of students' demographic attributes, contact information, applications and enrolment details, program information, and related academic information including graduation.

Domestic postsecondary applicants in Ontario are required to apply to colleges through the centralized web portal facilitated by Ontario College Application Service (OCAS). OCAS is an application processing centre for admissions for each of the 24 Ontario colleges. It collects and maintains detailed information about college applicants and enrollees. The OCAS data system, which collects information through the web portal, directly interfaces with the DC SIS system, and provides daily updates of applicant information through a direct electronic transmission.

As part of the OCAS application, applicants are strongly recommended to declare their prior postsecondary education. However, it is a voluntary question and many applicants choose to declare only partial information, or sometimes nothing at all. Furthermore, there is no validation of the information submitted in response to this question unless it is part of a programs' admission requirements.

Application information, including prior postsecondary experiences and additional demographic details, for the students included in the DC CSER dataset was collated from the SIS and is referred to as the **DC OCAS** dataset in this study.

In addition, the DC CSER dataset was further enhanced with information on students' prior programs of study at DC, year of study, and first semester grade point average (GPA) from the SIS system.

ONTARIO COLLEGE APPLICANT SYSTEM (OCAS) – SYSTEM OCAS DATASET

In addition to serving as the centralized processing centre for all of the 24 publicly-funded colleges, OCAS also maintains a centralized data warehouse detailing the full-time postsecondary enrolments at each of the colleges. OCAS receives the CSER reports from each of the 24 colleges, collates the longitudinal information in a data warehouse, and further enhances student enrolment information by matching it with the corresponding application information based on the Ontario Education Number (OEN).

The OEN is a unique numerical identifier attributed by the Ministry of Education to each student in the Province of Ontario when they start their academic journey in elementary school, and is carried through to postsecondary education in Ontario. For students who do not have a prior elementary or secondary academic history in the Province of Ontario (e.g., international students), the first college they attend assigns them with a unique numerical identifier as stipulated by MCU, and this unique identifier is carried through all

postsecondary education. OENs thus offer an important mechanism for tracking the transfer of students between different institutions, and their academic outcomes.

While the DC OCAS dataset provides some information on DC applicants' prior postsecondary experience, the information is neither complete nor validated. For the purpose of this study, it was important that students' prior postsecondary experiences be explored more fully and reliably. OCAS holds prior verified enrolment information for all of the 24 colleges in the system, and hence offers a unique opportunity to track the prior postsecondary experiences of the DC students in the Ontario publicly funded college system.

OENs for the students included in the DC CSER were provided to OCAS with a request for the prior enrolment history of these students at the various colleges over the last 20 years since 2000. For the any of the students who had a prior enrolment history in the college system, OCAS provided a dataset with the following details, where available:

- College(s) of previous enrolment
- Program(s) of previous enrolment
- Start Date(s) of previous program(s)
- First Generation status
- Aboriginal ancestry description
- Gender
- Country of citizenship
- Mother tongue
- Date of birth
- Applicant type
- Whether the student had a dual credit course record

This customized information on DC CSER students' entire enrolment history at the other 23 colleges was collated, and is referred to as the **System OCAS** dataset in this study.

PROGRAM CATEGORIES

This research study includes a comparative investigation of DC's skilled trades programs, with a particular focus on the construction sector related postsecondary programs. To ensure that the student data is analyzed within the proposed framework, students' postsecondary programs of enrolment at DC were distinctly classified into four categories depending on whether they were related to skilled trades and/or the construction sector:

- Skilled Trades Construction Related (Skilled Trades CR)
- Non-Skilled Trades Construction Related (Non-Skilled Trades CR)
- Skilled Trades Non-Construction Related (Skilled Trades NCR)
- Non-Skilled Trades Non-Construction Related (Non-Skilled Trades NCR)

The classification of a program as 'Construction Related' is intended to reflect the skilled trades designated by the Ontario College of Trades as 'Construction Trades'. Skilled Trades Non-Construction Related indicates that a program corresponds to a skilled trade that is classified in any of the other groups designated by the Ontario College of Trades (e.g., Services, Motive Power).

DC offers a total of 130 postsecondary programs across a wide range of disciplines. In addition to the apprenticeship and sector classifications provided by the Ontario College of Trades, the following occupational, industrial, and program related classifications were employed to organize DC programs across the four categories:

- National Occupational Classification (NOC)
- North American Industry Classification System (NAICS)
- Program Learning Outcomes as delineated on the *Program Standards* for the various postsecondary programs in Ontario, released by MCU, Ontario

Ontario College of Trades classification and Program Learning Outcomes as outlined on the Program Standards by MCU, were employed to determine the categorization of postsecondary programs between Skilled Trades and Non-Skilled Trades categories. These were then further assessed to determine their relevance to the construction sector. The construction sector employs a wide variety of occupations in skilled trades and 10 postsecondary programs at DC are included in the Skilled Trades CR category as presented in *Appendix B*. The remaining 20 skilled trades were included in the Skilled Trades NCR category.

There were a few programs that could have been classified in more than one program category. In such cases, any equivalencies established by Ministry of Labour, Ontario and Program Learning Outcomes were employed to categorize the program uniquely in one of the program categories. For example, while the graduates of the Mechanical Technician – Millwright program may find employment in the construction sector, this program was classified as industrial based on the Ministry of Labour, Ontario equivalency interpretation, and therefore included in the Skilled Trades NCR category.

The Non-Skilled Trades postsecondary programs were categorized according to the related occupations and industry where graduates have typically found employment in the past. NOC and NAICS data for each of these programs was assessed to determine whether they could be classified as related to the construction sector. Of particular note in the Non-Skilled Trades category are the Civil Engineering Technology and Architecture Engineering Technology programs. These are the only programs that are not typically included in the skilled trades category and yet play an important role in the construction sector. Hence, these programs are included in the Non-Skilled Trades CR category.

A complete list of the programs included in each category is available in *Appendix B*.

METHODS

This research study is unique and the first of its kind. Significant effort was deployed in exploring and addressing the data paucity in the skilled trades education area. The primary focus of this research study was to explore the data availability and collate extensive datasets to delineate the postsecondary pathways, and investigate the demographic profile of students enrolled in skilled trades related programs, particularly those related to the occupations in the construction sector. This research study also undertakes an exploratory, comparative investigation of student attributes and longitudinal trends across four defined program categories.

The research study proposes to explore the pathways of students who are enrolling in skilled trades programs, and whether exposure to prior postsecondary programs plays a role in their subsequent interest in the skilled trades. When the research proposal was formulated, the terms ‘direct entry’ and ‘non-direct entry’ were used to make this distinction. However, upon further exploration, it was revealed that these classifications would not be the best approach to examine the intended distinctions. While the term ‘direct entry’ implies that a student has enrolled in a postsecondary program right after graduating from high school, ‘non-direct entry’ does not imply that students undertook a prior postsecondary experience before enrolling in a subsequent program. Rather, ‘non-direct entry’ only implies that there was a time gap between the student’s graduation from high school and subsequent postsecondary enrolment. During that time gap, the student may or may not have attended postsecondary education at another institution. To ensure clarity, the research study refers to students as having ‘prior postsecondary enrolment’ instead of ‘non-direct entry’.

Key research questions were explored using descriptive analysis for the data variables as indicated below. The descriptive analysis is presented comparatively for each of the four program categories as identified in the prior section. In addition, insights derived from the descriptive analysis will help to establish trends in enrolment, a profile of student enrolments in each of the reporting years, and will further enable a comparative analysis across the four program categories.

<u>Student Demographic Profiles:</u>

- Enrolment
- Credentials
- Age
- Gender
- Residency Status (i.e., international vs. domestic)

Voluntary, self-reported information on Indigenous and First Generation status was provided by OCAS as part of System OCAS dataset, but it is not representative of the student population. Currently, the information on Indigenous and First Generation attributes of students exists in fragmented databases and there is no consolidated

dataset available for fulsome analysis and reporting. Hence this information was deemed inadequate to be included in the analysis for this research study.

Mobility Patterns:

- Prior (voluntary/unverified) Postsecondary Enrolment
- Prior (verified) Postsecondary Enrolment
- Number of Prior Institution(s) and Prior Program(s) Attended
- Prior (verified) Enrolment at DC

Occupational Cluster and Credential Pathways:

- Prior (verified) Enrolment by Occupational Cluster
- Prior (verified) Enrolment by Occupational Sub-Cluster
- Prior (verified) Postsecondary Enrolment by Credential
- Prior (verified) Postsecondary Program-Level Enrolment

Re-Enrolment:

- Number of Months Since Prior (verified) Postsecondary Enrolment

Additionally, regression analyses were conducted to investigate whether student demographic factors, prior postsecondary experience (verified), occupational cluster related to the prior program of study, prior credential level, and the time interval between prior postsecondary and subsequent DC program enrolment are predictors of student interest in skilled trades programs and subsequent success as determined by first semester GPA for students in skilled trades programs.

RESULTS AND DISCUSSION

This section presents findings from the preliminary but in-depth exploratory study of demographic profiles, mobility and academic success factors of students in skilled trades postsecondary programs, and particularly those in the construction sector.

In order to facilitate an understanding of how Skilled Trades programs compare to Non-Skilled Trades programs, as well as how Construction Related (CR) programs compare to Non-Construction Related (NCR) programs, the data are displayed for four distinct categories: Skilled Trades CR, Non-Skilled Trades CR, Skilled Trades NCR, and Non-Skilled Trades NCR.

There are three distinct datasets used in the analysis:

- The **DC CSER** dataset is a compilation of full-time postsecondary students enrolled at DC in the Fall semesters over the 2016 to 2020 period.
- A customized dataset referred to as **System OCAS***,* includes the enrolment history for these students at the other 23 colleges.
- The **DC OCAS** dataset includes details of DC students' applications through the OCAS portal.

Data presented in aggregate is a count of unique students over the 2016 to 2020 reporting period, and is based on their most recent enrolment record at DC. Conversely, data presented longitudinally includes a count of students in a given year, and therefore counts students more than once over the reporting period if they re-enrolled in a subsequent Fall semester between 2017 and 2020. The aggregate tables provide a summary of a given variable and allow for an overall comparison between the program categories, whereas the longitudinal tables allow for comparisons within a category to determine whether there have been any changes over time.

SECTION I: STUDENT POPULATION

A. ENROLMENT TRENDS (DC CSER)

Table 1 presents Fall postsecondary enrolment longitudinally according to the established program categories. This table includes the count and proportion of the student population, and are referenced in the subsequent data analysis.

Table 1: DC CSER - Total Postsecondary Enrolment; Fall

Program Category	2016	2017	2018	2019	2020
Skilled Trades CR	5.0% (510)	5.1% (559)	5.1% (597)	5.1% (600)	4.4% (466)
Non-Skilled Trades CR	1.0% (98)	1.1% (125)	1.3% (153)	1.6% (183)	1.8% (193)
Skilled Trades NCR	13.6% (1,378)	13.2% (1,433)	12.9% (1,499)	12.6% (1,476)	12.1% (1,282)
Non-Skilled Trades NCR	80.3% (8,120)	80.5% (8,756)	80.7% (9,380)	80.7% (9,424)	81.6% (8,628)
Total	**10,106**	**10,873**	**11,629**	**11,683**	**10,569**

Overall enrolment at DC had been increasing over the reporting period, but there was a decline in 2020 during the onset of the COVID-19 pandemic. A similar trend is evident for each category except for Non-Skilled Trades CR, which slightly increased enrolment in 2020. Enrolment in Skilled Trades NCR programs began to decline before the pandemic. Moreover, the proportion of DC enrolment accounted for by Skilled Trades related programming (CR & NCR) has steadily declined since 2016.

Table 2 presents a summary of enrolment by credential. Students who enrolled at DC in multiple programs over the reporting period are counted once, based on their most recent program.

Table 2: DC CSER – Total Postsecondary Enrolment by Credential; Aggregate

Program Category	Certificate	Diploma	Advanced Diploma	Graduate Certificate	Bachelor's Degree	Total
Skilled Trades CR	35.4% (651)	64.6% (1,187)	0.0% (0)	0.0% (0)	0.0% (0)	**1,838**
Non-Skilled Trades CR	0.0% (0)	17.5% (70)	82.5% (331)	0.0% (0)	0.0% (0)	**401**
Skilled Trades NCR	16.0% (712)	67.6% (3,009)	13.9% (620)	2.5% (110)	0.0% (0)	**4,451**
Non-Skilled Trades NCR	14.7% (4,055)	51.4% (14,318)	21.6% (5,983)	12.0% (3,307)	0.3% (80)	**27,743**
Total	**15.8% (5,418)**	**53.8% (18,584)**	**20.2% (6,934)**	**10.0% (3,417)**	**0.2% (80)**	**34,433**

Only Certificate and Diploma programs are included in the Skilled Trades CR category, and hence the students are limited to only those credential levels. There are opportunities to pursue construction related advanced diplomas through Non-Skilled Trades programs, such as Civil Engineering Technology, but graduate certificates and bachelor's degrees are only currently available in NCR programs.

Table 3 presents longitudinal enrolment for Skilled Trades CR programs by credential. Students are counted once in a given year, but may be counted multiple times over the reporting period.

Table 3: DC CSER – Total Postsecondary Enrolment in Skilled Trades CR Programs by Credential; Fall

Credential	2016	2017	2018	2019	2020
Certificate	32.4% (165)	33.8% (189)	33.0% (197)	29.7% (178)	29.8% (139)
Diploma	67.6% (345)	66.2% (370)	67.0% (400)	70.3% (422)	70.2% (327)
Total	**510**	**559**	**597**	**600**	**466**

It is evident in Table 3 that students enrolling in Skilled Trades CR programs are increasingly opting for the highest credential available (diploma).

Table 4 through Table 6 present longitudinal enrolment for the remaining program categories by credential.

Table 4: DC CSER – Total Postsecondary Enrolment in Non-Skilled Trades CR Programs by Credential; Fall

Credential	2016	2017	2018	2019	2020
Diploma	23.5% (23)	28.8% (36)	20.9% (32)	14.2% (26)	10.4% (20)
Advanced Diploma	76.5% (75)	71.2% (89)	79.1% (121)	85.8% (157)	89.6% (173)
Total	**98**	**125**	**153**	**183**	**193**

Similar to Skilled Trades CR programs, there is an increasing trend of enrolling in higher credentials among students in Non-Skilled Trades CR programs.

Table 5: DC CSER – Total Postsecondary Enrolment in Skilled Trades NCR Programs by Credential; Fall

Credential	2016	2017	2018	2019	2020
Certificate	12.9% (178)	13.4% (192)	14.9% (223)	14.2% (210)	13.9% (178)
Diploma	67.5% (930)	68.7% (985)	67.9% (1,018)	71.2% (1,051)	70.0% (898)
Advanced Diploma	16.7% (230)	15.4% (221)	14.8% (222)	12.6% (186)	14.1% (181)
Graduate Certificate	2.9% (40)	2.4% (35)	2.4% (36)	2.0% (29)	2.0% (25)
Total	**1,378**	**1,433**	**1,499**	**1,476**	**1,282**

The distribution of enrolment among credentials has been relatively stable for Skilled Trades NCR students over the reporting period.

Table 6: DC CSER – Total Postsecondary Enrolment in Non-Skilled Trades NCR Programs by Credential; Fall

Credential	2016	2017	2018	2019	2020
Certificate	14.7% (1,192)	14.1% (1,237)	13.1% (1,229)	12.5% (1,180)	10.8% (933)
Diploma	52.4% (4,250)	54.6% (4,780)	55.5% (5,208)	54.8% (5,164)	54.3% (4,683)
Advanced Diploma	25.6% (2,080)	24.4% (2,135)	23.6% (2,211)	24.2% (2,282)	24.5% (2,116)
Graduate Certificate	7.4% (598)	6.9% (604)	7.6% (710)	8.1% (768)	9.5% (823)
Bachelor's Degree	0.0% (0)	0.0% (0)	0.2% (22)	0.3% (30)	0.8% (73)
Total	**8,120**	**8,756**	**9,380**	**9,424**	**8,628**

Similar to Skilled Trades NCR programs, the enrolment distribution of Non-Skilled Trades NCR programs has remained relatively stable over the reporting period, though there was a slight increase in graduate certificate enrolments in 2020 while enrolment in certificates declined.

B. DEMOGRAPHICS (DC CSER)

To further develop the profile of Skilled Trades CR students, socio-demographic characteristics (age, gender, residency and Indigenous identity) are explored in Table 7 through Table 9.

The age distribution of college students in Ontario tends to be wide, but this study seeks to explore the age trends specific to each of the program categories. For the purposes of this research, age is calculated as of the enrolment year. The analysis is based on median age rather than average age in order to avoid results being skewed by outliers. Median age will provide a reliable indicator of trends in age composition among the four program categories.

The gender composition of Ontario colleges is balanced between males and females, but the literature suggests that males are significantly overrepresented in skilled trades occupations. The analysis of gender in this study is limited to the categories used in college application and enrolment reporting (male, female and unknown).

International student enrolment has been increasing in the Ontario college system, and the literature identifies immigrants as an underrepresented group in skilled trades. For the purposes of this research, international students are identified as per Funding Status.

According to the literature, the skilled trades are an important source of employment for Indigenous Canadians; therefore, the proportion of students who self-identify as Indigenous is also explored in this study.

AGE

Table 7 presents the median age of students enrolled in each program category over the reporting period.

Table 7: DC CSER – Median Age of Postsecondary Students; Fall

Program Category	2016	2017	2018	2019	2020
Skilled Trades CR	24.0 (510)	23.0 (559)	22.0 (597)	21.0 (600)	20.0 (466)
Non-Skilled Trades CR	25.0 (98)	25.0 (125)	23.0 (153)	22.0 (183)	21.0 (193)
Skilled Trades NCR	25.0 (1,378)	24.0 (1,433)	23.0 (1,499)	22.0 (1,476)	21.0 (1,282)
Non-Skilled Trades NCR	26.0 (8,120)	25.0 (8,756)	24.0 (9,380)	23.0 (9,424)	22.0 (8,628)
Total	**25.0 (10,106)**	**24.0 (10,873)**	**23.0 (11,629)**	**22.0 (11,683)**	**22.0 (10,569)**

The median age of DC students has declined by approximately three years between Fall 2016 and Fall 2020. This trend is evident among all four program categories. It should also be noted that Skilled Trades CR programs have consistently had a lower median age than the other three categories over the reporting period.

GENDER

Table 8 presents the proportion of students who identify as male, female or unknown genders within each program category over the reporting period.

Table 8: DC CSER – Gender Identity of Postsecondary Students; Fall

Program Category	Gender	2016	2017	2018	2019	2020
Skilled Trades CR	Male	97.1% (495)	96.6% (540)	95.0% (567)	92.8% (557)	93.6% (436)
	Female	2.9% (15)	3.4% (19)	5.0% (30)	7.0% (42)	6.0% (28)
	Unknown	0.0% (0)	0.0% (0)	0.0% (0)	0.2% (1)	0.4% (2)
Non-Skilled Trades CR	Male	73.5% (72)	70.48% (88)	73.2% (112)	76.0% (139)	73.1% (141)
	Female	26.5% (26)	29.6% (37)	26.8% (41)	23.5% (43)	26.9% (52)
	Unknown	0.0% (0)	0.0% (0)	0.0% (0)	0.5% (1)	0.0% (0)
Skilled Trades NCR	Male	53.9% (743)	55.5% (797)	58.4% (875)	57.2% (844)	56.3% (723)
	Female	46.0% (634)	44.4% (636)	41.5% (622)	42.5% (627)	43.4% (556)
	Unknown	0.1% (1)	0.0% (0)	0.1% (2)	0.3% (5)	0.3% (4)
Non-Skilled Trades NCR	Male	47.1% (3,821)	47.9% (4,192)	47.4% (4,444)	47.1% (4,437)	45.2% (3,901)
	Female	52.8% (4,288)	52.1% (4,564)	52.6% (4,935)	52.7% (4,967)	54.5% (4,696)
	Unknown	0.1% (11)	0.0% (0)	0.0% (1)	0.2% (20)	0.3% (30)
Total	**Male**	**50.8% (5,131)**	**51.7% (5,617)**	**51.6% (5,998)**	**51.2% (5,977)**	**49.2% (5,201)**
	Female	**49.1% (4,963)**	**48.3% (5,256)**	**48.4% (5,628)**	**48.6% (5,679)**	**50.5% (5,332)**
	Unknown	**0.1% (12)**	**0.0% (0)**	**0.0% (3)**	**0.2% (27)**	**0.3% (36)**

CR programs (both Skilled Trades and Non-Skilled Trades) have consistently had a very high proportion of male students, while the Skilled Trades NCR programs have

more female representation. Comparatively, DC overall and the Non-Skilled Trades NCR programs are relatively balanced in regards to male and female genders.

RESIDENCY STATUS

Table 9 presents the proportion of international students that are enrolled in each program category over the reporting period.

Table 9: DC CSER – Proportion of International Students; Fall

Program Category	2016	2017	2018	2019	2020
Skilled Trades CR	2.0% (10)	1.6% (9)	2.7% (16)	3.0% (18)	2.6% (12)
Non-Skilled Trades CR	2.0% (2)	8.0% (10)	9.2% (14)	10.4% (19)	6.7% (13)
Skilled Trades NCR	7.0% (97)	8.2% (118)	12.1% (181)	13.1% (194)	9.5% (122)
Non-Skilled Trades NCR	6.1% (492)	10.8% (950)	17.4% (1,636)	18.6% (1,757)	15.4% (1,327)
Total	**5.9% (601)**	**10.0% (1,087)**	**15.9% (1,847)**	**17.0% (1,988)**	**14.0% (1,474)**

The vast majority of students in the Skilled Trades CR category are domestic students. The proportion of international students was steadily increasing for each of the other three groups over the reporting period, but there was a decline in 2020.

INDIGENOUS IDENTITY

There are three distinct data sources to identify Indigenous students at DC. Students can self-identify as Indigenous on their application through OCAS, an internal Equity, Diversity & Inclusion (EDI) survey, or through a form submitted to the First Peoples Indigenous Centre at DC. Currently, these three data sources are fragmented, and it was determined that using only the data collected through OCAS does not provide a fulsome picture of DC's Indigenous population. As a result, data regarding Indigenous identity has been excluded from the analysis. However, there will be an opportunity to explore this demographic in future reporting, as the Office of Equity, Diversity and Inclusion at DC is working to consolidate the three data sources to produce an accurate representation of the Indigenous student population.

OVERALL STUDENT PROFILE

Table 10 presents an overall student profile for DC and each of the four program categories. This table is based on an aggregation of students over the reporting period based on their most recent program at DC.

Table 10: DC CSER – Demographic Profile by Program Category; Aggregate

Program Category	Age (Median/years)	Gender (%Male)	Residency (%International)
Skilled Trades CR	23.0	94.9%	2.2%
Non-Skilled Trades CR	23.0	73.2%	7.2%
Skilled Trades NCR	23.0	57.3%	9.3%
Non-Skilled Trades NCR	24.0	45.4%	14.5%
Total	**24.0**	**49.7%**	**13.1%**

Overall, Skilled Trades CR students at DC are predominantly domestic, male and younger than the DC average. The demographics of students in Skilled Trades NCR programs differ significantly in gender and residency from Skilled Trades CR students.

SECTION II: MOBILITY PATTERNS

There is significant debate on whether there is a shortage of skilled trades workers in Ontario. This has led to renewed interest in exploring whether students in skilled trades programs initially make a committed choice to this field of study or whether they follow an academic journey through other postsecondary programs before pursuing education in skilled trades.

In this section, the postsecondary experiences of the students enrolled at DC over the 2016 to 2020 reporting period are explored. Prior postsecondary experience is considered both in the context of education at another postsecondary institution, as well as previous enrolment in another program at DC. There is also an effort to distinguish between having prior postsecondary enrolment and utilizing credit transfer.

A. SELF-DECLARED PRIOR POSTSECONDARY EXPERIENCE (DC OCAS)

During the application process though OCAS, students have the opportunity to indicate whether they have postsecondary experience at an Ontario postsecondary institution. An exploration of the DC OCAS dataset provides an initial understanding of the proportion of domestic students with prior postsecondary experiences, as well as the type of institution they attended. This is the only dataset that includes prior enrolment at an Ontario university.

Table 11 presents the residency status of DC students over the reporting period. The mobility patterns of the domestic students identified in this table are explored further in this section.

Table 11: DC CSER – Postsecondary Enrolment by Student Type; Aggregate

Program Category	Domestic	International	Total
Skilled Trades CR	97.8% (1,797)	2.2% (41)	**1,838**
Non-Skilled Trades CR	92.8% (372)	7.2% (29)	**401**
Skilled Trades NCR	90.7% (4,038)	9.3% (413)	**4,451**
Non-Skilled Trades NCR	85.5% (23,719)	14.5% (4,024)	**27,742**
Total	**86.9% (29,926)**	**13.1% (4,507)**	**34,433**

Table 12 presents the residency status of DC students for each year to explore the change in proportion of domestic and international student populations over the five-year reporting period. The overall decline in enrolment in 2020 coincides with the onset of the COVID-19 pandemic.

Table 12: DC CSER – Postsecondary Enrolment by Student Type; Fall

Program Category	Residency	2016	2017	2018	2019	2020
Skilled Trades CR	Domestic	98.0% (500)	98.4% (550)	97.3% (581)	97.0% (582)	97.4% (454)
	International	2.0% (10)	1.6% (9)	2.7% (16)	3.0% (18)	2.6% (12)
Non-Skilled Trades CR	Domestic	98.0% (96)	92.0% (115)	90.8% (139)	89.6% (164)	93.3% (180)
	International	2.0% (2)	8.0% (10)	9.2% (14)	10.4% (19)	6.7% (13)
Skilled Trades NCR	Domestic	93.0% (1,281)	91.8% (1,315)	87.9% (1,318)	86.9% (1,282)	90.5% (1,160)
	International	7.0% (97)	8.2% (118)	12.1% (181)	13.1% (194)	9.5% (122)
Non-Skilled Trades NCR	Domestic	93.9% (7,628)	89.2% (7,806)	82.6% (7,744)	81.4% (7,667)	84.6% (7,301)
	International	6.1% (492)	10.8% (950)	17.4% (1,636)	18.6% (1,757)	15.4% (1,327)
Total	**Domestic**	**94.1% (9,505)**	**90.0% (9,786)**	**84.1% (9,782)**	**83.0% (9,695)**	**86.1% (9,095)**
	International	**5.9% (601)**	**10.0% (1,087)**	**15.9% (1,847)**	**17.0% (1,988)**	**13.9% (1,474)**

Table 13 indicates the number of students enrolled at DC over the 2016 to 2020 reporting period that had self-declared prior postsecondary experience when applying to a program at DC.

Due to low counts, international institutions, private institutions, and non-publicly funded colleges (i.e., career colleges) are excluded from the table below. If a student had previously attended another program at DC, this experience is included under the Ontario college category.

Table 13: DC OCAS – Self-Declared Prior Postsecondary Experience by Program Category; Aggregate

Program Category	Self-Declared Prior Postsecondary Experience	No Self-Declared Prior Postsecondary Experience	Total
Skilled Trades CR	5.0% (91)	95.0% (1,747)	**1,838**
Non-Skilled Trades CR	4.5% (18)	95.5% (383)	**401**
Skilled Trades NCR	7.0% (310)	93.0% (4,141)	**4,451**
Non-Skilled Trades NCR	9.2% (2,559)	90.8% (25,184)	**27,743**
Total	**8.6% (2,978)**	**91.4% (31,455)**	**34,433**

Approximately 9% of all DC students over the reporting period self-declared prior postsecondary experience on their application to DC. When considering the base population of domestic students only (29,926 as established in Table 11), the proportion is slightly higher at 10%.

Table 14 indicates the type of institution that was attended by students who declared a prior postsecondary experience on their OCAS application. The data are presented longitudinally, therefore students may be counted more than once over the reporting period if they submitted multiple applications across the years.

Table 14: DC OCAS - Self-Declared Prior Enrolment Experiences; Fall

Institution Type	2016	2017	2018	2019	2020
Ontario College	83.5% (609)	84.9% (678)	86.1% (661)	88.1% (796)	89.3% (815)
Ontario University	16.5% (120)	15.1% (121)	13.9% (107)	11.9% (108)	10.7% (98)
Total	**729**	**799**	**768**	**904**	**913**

As is evident in Table 14, the vast majority of students who self-declared a prior postsecondary experience at another Ontario institution, had attended a college.

An exploration of this data for each program category did not yield anything of note.

B. CONFIRMED PRIOR POSTSECONDARY EXPERIENCE (SYSTEM OCAS)

It is evident that students who self-declared prior postsecondary experience had predominately attended an Ontario publicly-funded college. However, the optional nature of this self-declaration suggests that it underrepresents the prior postsecondary experiences of DC's students. The mobility patterns of students are more thoroughly explored through use of OCAS records of verified enrolment. The System OCAS dataset includes DC students' authenticated records of enrolment at other colleges, prior to attending DC.

Table 15 presents the proportion of students who were enrolled at another college prior to enrolling at DC. Previous enrolment at DC is not included in this analysis.

Table 15: System OCAS – Prior Postsecondary Experience at Other Colleges by Program Category; Aggregate

Program Category	Prior Postsecondary Experience	No Prior Postsecondary Experience	Total
Skilled Trades CR	6.1% (113)	93.9% (1,725)	**1,838**
Non-Skilled Trades CR	11.7% (47)	88.3% (354)	**401**
Skilled Trades NCR	7.4% (331)	92.6% (4,120)	**4,451**
Non-Skilled Trades NCR	7.7% (2,139)	92.3% (25,606)	**27,743**
Total	**7.6% (2,630)**	**92.4% (31,803)**	**34,433**

Proportions in Table 15, indicate that approximately 8% of students had prior postsecondary experience at another college prior to enrolling at DC. The Skilled Trades CR category has the lowest proportion of students with prior postsecondary experience.

Table 16 presents the proportion of students with prior postsecondary experience by year in order to assess whether there have been changes over time.

Table 16: System OCAS – Prior Postsecondary Experience at Other Colleges by Program Category; Fall

Program Category	2016	2017	2018	2019	2020
Skilled Trades CR	3.9% (20)	6.1% (34)	5.4% (32)	7.7% (46)	8.4% (39)
Non-Skilled Trades CR	7.1% (7)	10.4% (13)	11.1% (17)	10.9% (20)	13.5% (26)
Skilled Trades NCR	3.7% (51)	6.7% (97)	8.9% (133)	9.1% (135)	8.7% (113)
Non-Skilled Trades NCR	5.0% (403)	7.0% (624)	8.0% (743)	8.5% (802)	9.0% (779)
Total	**4.8% (481)**	**7.0% (760)**	**8.0% (928)**	**8.6% (1,003)**	**9.0% (953)**

The proportion of students with prior postsecondary experience increased for all four program categories since the beginning of the reporting period. In 2020, the proportion of students in Skilled Trades CR programs with prior postsecondary experience is only slightly lower than Skilled Trades NCR and Non-Skilled Trades NCR.

Table 17 and Table 18 present the number of colleges and programs that students enrolled in prior to DC.

Table 17: System OCAS - Number of Institutions Attended Prior to DC by Program Category; Aggregate

Program Category	1	2	3	4	Total
Skilled Trades CR	92.8% (103)	6.3% (7)	0.9% (1)	0.0% (0)	**111**
Non-Skilled Trades CR	95.5% (42)	4.5% (2)	0.0% (0)	0.0% (0)	**44**
Skilled Trades NCR	90.6% (298)	9.4% (31)	0.0% (0)	0.0% (0)	**329**
Non-Skilled Trades NCR	90.1% (1,934)	8.9% (190)	1.0% (21)	0.0% (1)	**2,146**
Total	**90.4% (2,377)**	**8.7% (230)**	**0.8% (22)**	**0.0% (1)**	**2,630**

Table 18: System OCAS - Number of Programs Attended Prior to DC by Program Category; Aggregate

Program Category	1	2	3	4	5+	Total
Skilled Trades CR	84.7% (94)	11.7% (13)	2.7% (3)	0.9% (1)	0.0% (0)	**111**
Non-Skilled Trades CR	79.5% (35)	9.1% (4)	11.4% (5)	0.0% (0)	0.0% (0)	**44**
Skilled Trades NCR	78.7% (259)	17.6% (58)	3.0% (10)	0.6% (2)	0.0% (0)	**329**
Non-Skilled Trades NCR	73.6% (1,580)	20.8% (446)	4.8% (103)	0.6% (12)	0.2% (5)	**2,146**
Total	**74.8% (1,968)**	**19.8% (521)**	**4.6% (121)**	**0.6% (15)**	**0.2% (5)**	**2,630**

Overall, very few students have enrolled in more than one college prior to enrolling at DC. However, there is larger proportion of students who enrolled in multiple programs prior to DC.

A very small proportion of students enrolled in Skilled Trades CR programs have prior postsecondary experience, and those that do have primarily attended only one other institution and one other program. Building an understanding of why there is a relatively lower level of mobility for students entering into Skilled Trades CR programs will help determine whether there is a need to increase pathways or other mobility opportunities.

C. DC TO DC (DC CSER)

The previous subsection explored the prior postsecondary experience of DC students at the other 23 Ontario colleges. The data analyzed thus far did not include students' prior experience at DC in other programs. Table 19 indicates the proportion of students with a record of postsecondary enrolment at DC prior to enrolling in their most recent program at DC. It is important to note that students who were found to have prior DC enrolment in Table 19 may also have been identified as having prior postsecondary enrolment at another college in the analysis presented in prior sections.

Table 19: DC CSER – Proportion of Students with Prior DC Enrolment; Aggregate

Program Category	Prior DC Enrolment	No Prior DC Enrolment	Total
Skilled Trades CR	33.1% (608)	66.9% (1,230)	**1,838**
Non-Skilled Trades CR	34.9% (140)	65.1% (261)	**401**
Skilled Trades NCR	24.1% (1,072)	75.9% (3,379)	**4,451**
Non-Skilled Trades NCR	32.7% (9,071)	67.3% (18,672)	**27,743**
Total	**31.6% (10,891)**	**66.9% (23,542)**	**34,433**

It is evident that a large proportion of students (32%) attend multiple programs at DC. There is a higher proportion of students in CR programs that had previously enrolled in another DC program than both of the NCR categories.

Table 20 provides insight into the types of programs that students had previously been enrolled in at DC. The table below indicates the type of program students were enrolled in at DC prior to their most recent enrolment across the four program categories of interest.

Table 20: DC CSER – Proportion of Students with Prior DC Enrolment by Program Category; Aggregate

Most Recent Program Category	Previous Program Category				
	Skilled Trades CR	Non-Skilled Trades CR	Skilled Trades NCR	Non-Skilled Trades NCR	Total
Skilled Trades CR	78.6% (478)	0.8% (5)	12.0% (73)	8.6% (52)	**608**
Non-Skilled Trades CR	3.6% (5)	85.7% (120)	1.4% (2)	9.3% (13)	**140**
Skilled Trades NCR	7.0% (75)	0.7% (8)	64.6% (692)	27.7% (297)	**1,072**
Non-Skilled Trades NCR	0.6% (58)	0.1% (9)	3.5% (314)	95.8% (8,689)	**9,070**
Total	**5.7% (616)**	**1.3% (142)**	**9.9% (1,081)**	**83.1% (9,051)**	**10,890**

The majority of students with prior postsecondary experience at DC subsequently enrolled in programs within the same category. It is evident that a large proportion (91%) of students in Skilled Trades CR programs had previously been enrolled in Skilled Trades related programs (78.6% in Skilled Trades CR and 12.0% in Skilled

Trades NCR). It appears there is a higher level of mobility from other categories into Skilled Trades NCR programs.

D. CREDIT FOR PRIOR POSTSECONDARY EXPERIENCE (DC CSER)

Having established that approximately 8% of DC students over the reporting period have prior postsecondary experience at another college, it is important to consider whether students were building on their prior experiences. Credit transfer enables students to receive credit for prior learning, and progress in their studies without having to unnecessarily repeat courses. A credit transfer flag (CT flag) on a student record indicates that a student was granted credit from a previous program (either completed or partially completed). The CT flag serves as an indicator that the program in which students enrolled at DC is related to their prior education at another college.

An important limitation to recognize is that once applied, the CT flag remains on the student record for the duration of their time at DC, irrespective of the subsequent related or unrelated DC program in which they may enrol. While this is a significant limitation, an analysis of the CT flag was conducted to establish a baseline assessment of the proportion of students who had been approved for credit for prior learning, and how the proportions may be distributed across the four program categories.

Based on the analysis of the subsection of these first time CT flag students, Table 21 presents the proportion of DC students with prior postsecondary experience at another college who utilized credit transfer.

Table 21: DC CSER – Proportion of Students with Prior Postsecondary Enrolment by CT Flag; Aggregate

Program Category	Has Credit Flag	Does not have Credit Flag	Total
Skilled Trades CR	17.7% (20)	82.3% (93)	**113**
Non-Skilled Trades CR	25.5% (12)	74.5% (35)	**47**
Skilled Trades NCR	22.1% (73)	77.9% (258)	**331**
Non-Skilled Trades NCR	18.2% (389)	81.8% (1,750)	**2,139**
Total	**18.8% (494)**	**81.2% (2,136)**	**2,630**

It is evident that a lower proportion of students in Skilled Trades CR programs have utilized credit transfer as compared to the other categories.

Table 22 explores the five-year trend of CT flags by the program categories.

Table 22: DC CSER – Proportion of Students with Prior Postsecondary Enrolment by CT Flag by Program Category; Fall

Program Category	Credit Status	2016	2017	2018	2019	2020
Skilled Trades CR	Has Credit Flag	0.0% (0)	23.5% (8)	9.4% (3)	6.5% (3)	23.1% (9)
	No Credit Flag	100.0% (20)	76.5% (26)	90.6% (29)	93.5% (43)	76.9% (30)
Non-Skilled Trades CR	Has Credit Flag	0.0% (0)	30.8% (4)	23.5% (4)	15.0% (3)	30.8% (8)
	No Credit Flag	100.0% (7)	69.2% (9)	76.5% (13)	85.0% (17)	69.2% (18)
Skilled Trades NCR	Has Credit Flag	0.0% (0)	28.1% (27)	30.1% (40)	15.6% (21)	18.0% (20)
	No Credit Flag	100.0% (51)	72.9% (70)	69.9% (93)	84.4% (114)	83.8% (93)
Non-Skilled Trades NCR	Has Credit Flag	0.2% (1)	19.9% (123)	20.6% (154)	14.7% (118)	22.4% (174)
	No Credit Flag	99.8% (402)	81.2% (501)	79.4% (592)	85.3% (684)	77.9% (605)

While examining the use of credit transfer among the four categories provides some insight into the mobility patterns of students, the process by which the CT flag is applied inhibits analysis. It is not possible to assert that a student used credit transfer for the most recent program they are enrolled in, since the flag is permanent on a student record once applied. As a result of this limitation, the next section explores mobility patterns based on attributes of prior and most recent programs.

SECTION III: OCCUPATIONAL CLUSTER & CREDENTIAL PATHWAYS

This section explores the prior postsecondary experiences of DC students to determine whether there are pathways stemming from specific areas of study, credentials or programs into Skilled Trades CR programs. The prior postsecondary experiences are examined using the OCAS System dataset that includes students who have a record of enrolment at another college only, and excludes DC. Whether a student completed the program in which they were enrolled is not accounted for in this analysis.

Table 23 through Table 25 present data based on occupational clusters and sub-clusters. An occupational cluster is a grouping of MCU codes containing a number of programs leading to related occupations. Occupational clusters are defined in the MTCU-APS Table maintained by MCU, and include Applied Arts, Business, Health, and Technology, which are further subdivided into more specific occupational areas referred to as sub-clusters.

A. OCCUPATIONAL CLUSTERS (SYSTEM OCAS)

Table 23 cross tabulates the occupational cluster in which students were enrolled prior to DC with the occupational cluster of their most recent program at DC.

Table 23: System OCAS – Occupational Cluster of Enrolment Prior to and at DC; Aggregate

Most Recent Occupational Cluster at DC	Occupational Cluster Prior to DC				
	Arts	Business	Health	Technology	Total
Arts	62.6% (649)	19.2% (199)	8.5% (88)	9.7% (101)	**1,037**
Business	42.6% (243)	37.8% (216)	6.0% (34)	13.7% (78)	**571**
Health	38.3% (200)	5.9% (31)	51.7% (270)	4.0% (21)	**522**
Technology	26.4% (132)	13.6% (68)	5.4% (27)	54.6% (273)	**500**
Total	**46.5% (1,224)**	**19.5% (514)**	**15.9% (419)**	**18.0% (473)**	**2,630**

CR programs are classified under the Technology occupational cluster. While approximately half of the students enrolled in the Technology occupational cluster prior to DC continued in this same cluster at DC, approximately 45% of students moved from Technology programs into Arts, Business or Health. This is indicative of students shifting career paths. The greatest shift into Technology from another occupational cluster is Business (14%).

Table 24 indicates the occupational cluster prior to enrolling at DC according to program category. This table provides insight into whether students continued their education in a related field.

Table 24: System OCAS – Most Recent Occupational Cluster of Enrolment Prior to DC by Program Category; Aggregate

Program Category	Arts	Business	Health	Technology	Total
Skilled Trades CR	31.5% (35)	13.5% (15)	2.7% (3)	52.3% (58)	**111**
Non-Skilled Trades CR	11.4% (5)	6.8% (3)	2.3% (1)	79.6% (35)	**44**
Skilled Trades NCR	41.0% (135)	24.0% (79)	5.8% (18)	29.5% (97)	**329**
Non-Skilled Trades NCR	48.9% (1049)	19.4% (417)	18.5% (397)	13.2% (283)	**2,146**
Total	**46.6% (1,224)**	**19.5% (514)**	**15.9% (419)**	**18.0% (473)**	**2,630**

A significant proportion of the students in Skilled Trades CR programs at DC had previously been enrolled in the programs affiliated with Technology occupational cluster. Students in Skilled Trades NCR programs however, come from a variety of occupational clusters.

DC students enrolled in CR programs, whether in the Skilled Trades category or Non-Skilled Trades category, had prior postsecondary experience in the programs affiliated with the Technology cluster at 52.3% and 79.6% respectively.

B. OCCUPATIONAL SUB-CLUSTERS (SYSTEM OCAS)

Table 25 presents select occupational sub-clusters in which students were enrolled prior to DC. For the purposes of this analysis, the sub-clusters most associated with Skilled Trades CR are prioritized (i.e., sub-clusters that represent five or more students in Skilled Trades CR programs are listed, while all others are included in "Other").

Table 25: System OCAS – Most Recent Occupational Sub-Cluster of Enrolment Prior to DC; Aggregate

Program Category	Electronics	Preparatory/ Upgrading	Mechanical	Law And Security	Media	Business Management	Other	Total
Skilled Trades CR	18.9% (21)	12.6% (14)	7.2% (8)	7.2% (8)	4.5% (5)	5.5% (5)	55.0% (50)	**111**
Non-Skilled Trades CR	4.5% (2)	2.3% (1)	9.1% (4)	0.0% (0)	0.0% (0)	2.3% (1)	18.2% (36)	**44**
Skilled Trades NCR	7.3% (24)	6.7% (22)	4.9% (16)	3.0% (10)	4.6% (15)	2.4% (8)	28.9% (234)	**329**
Non-Skilled Trades NCR	3.3% (71)	15.3% (328)	2.2% (47)	6.8% (145)	5.8% (125)	3.6% (77)	37.0% (1,353)	**2,146**
Total	**4.5% (118)**	**13.9% (365)**	**2.9% (75)**	**6.2% (163)**	**5.5% (145)**	**3.5% (91)**	**63.6% (1,673)**	**2,630**

It is evident that a relatively large proportion of students in Skilled Trades CR programs had previously enrolled in Electronics programs at other colleges.

C. CREDENTIALS (SYSTEM OCAS)

The credentials analysis explores whether students enrolled in specific credentials pathway more readily into the skilled trades programs, particularly those related to the construction sector. Table 26 presents the credential in which students were enrolled prior to their most recent program at DC.

Table 26: System OCAS – Most Recent Credential of Enrolment Prior to DC; Aggregate

Program Category	Certificate	Diploma	Advanced Diploma	Graduate Certificate	Bachelor's Degree	Total
Skilled Trades CR	27.5% (30)	48.6% (55)	20.2% (22)	0.0% (0)	3.7% (4)	**111**
Non-Skilled Trades CR	16.3% (7)	41.9% (19)	34.9% (15)	4.7% (2)	2.3% (1)	**44**
Skilled Trades NCR	19.8% (65)	54.4% (179)	22.8% (75)	0.9% (3)	2.1% (7)	**329**
Non-Skilled Trades NCR	24.0% (514)	46.7% (1,005)	19.8% (425)	2.2% (46)	7.3% (156)	**2,146**
Total	**616**	**1,258**	**537**	**51**	**168**	**2,630**

Across all four program categories, the highest proportion of students have engaged in prior postsecondary education at the diploma level. This finding, however, in part could be attributed to the credential mix offered at the colleges collectively, as diplomas account for approximately 30% of all programs.

The key finding of note is that a significant proportion (64.6%) of Skilled Trades CR students enrolled at DC in diploma level postsecondary programs (refer to Table 2), and that a significant proportion of Skilled Trades CR students engaged in prior postsecondary education at the diploma level (Table 26). The disposition to move from a diploma program to a diploma program is a preliminary indication of opportunities for credit transfers for these students.

D. PROGRAM (SYSTEM OCAS)

Figure 1 presents the most common programs that students were enrolled in prior to their most recent program at DC. The number of students enrolled in each program over the reporting period is indicated in parentheses.

Figure 1: System OCAS - Most Recent Program of Enrolment Prior to DC; Aggregate

Skilled Trades CR
Electrical Engineering Technician (9)
Police Foundations (6)
Electrical Techniques (5)
Trades and Technology Fundamentals (5)
Heating, Refrigeration and Air Conditioning Technician (4)
Building Renovation Technology (3)
Paramedic (3)

Non-Skilled Trades – CR
Civil Engineering Technology (5)
Architectural Technology (5)
Civil Engineering Technician (3)
Architectural Technician (2)
Electrical Engineering Technician (2)

Skilled Trades NCR
Early Childhood Education (11)
Culinary Management (11)
Social Service Worker (10)
Child and Youth Care (10)
Police Foundations (6)
Child and Youth Worker (5)

Non-Skilled Trades NCR
Police Foundations (74)
Bachelor of Science in Nursing (65)
Social Service Worker (54)
Pre-Health Sciences Pathway to Certificates and Diplomas (52)
Practical Nursing (48)
Paramedic (45)
Pre-Health Science (44)
Early Childhood Education (43)

Figure 1 indicates that at least a few students from Civil and Architecture programs at other colleges have chosen to subsequently enroll at DC in Civil/Architecture programs.

SECTION IV: TIME BEFORE RE-ENROLMENT

This section is an exploratory attempt to examine the time associated with the transition from one program to another. Since each of the four program categories has a different set of credentials available, it implies that students will take varying lengths of time to complete their credential, and that direct comparisons cannot be made between the four program categories for the re-enrolment analysis. Graduation status from prior postsecondary program(s) for the student population is unfortunately not available as part of the dataset examined in this study, and hence the varying lengths of time between prior postsecondary enrolment and the subsequent postsecondary program enrolment cannot be fully accounted for. The data is, however, presented longitudinally to allow an analysis of changes over time.

It is important to note that the length of time indicates the number of months between records of enrolment. The data does not consider completion of a program. Future analysis would benefit from examining the duration of time between graduation and beginning a new program.

Table 27 indicates the median number of months between students' prior postsecondary enrolment and their most recent enrolment at DC.

Table 27: System OCAS – Number of Months Since Prior Postsecondary Enrolment and Most Recent Program at DC; Aggregate

Program Category	2016	2017	2018	2019	2020	Total
Skilled Trades CR	13.2 (21)	20.3 (21)	24.3 (22)	24.3 (27)	34.5 (20)	**24.3 (111)**
Non-Skilled Trades CR	12.2 (9)	24.4 (7)	30.4 (8)	22.3 (8)	24.4 (12)	**24.4 (44)**
Skilled Trades NCR	24.4 (52)	24.4 (66)	24.3 (81)	36.5 (78)	36.5 (52)	**24.4 (329)**
Non-Skilled Trades NCR	24.4 (411)	24.4 (429)	24.3 (459)	24.3 (441)	32.5 (406)	**24.4 (2,146)**
Total	**24.4 (493)**	**24.4 (523)**	**24.3 (570)**	**24.3 (554)**	**32.5 (490)**	**24.4 (2,630)**

On average, two years have elapsed between the time students in Skilled Trades CR programs were enrolled at another college and their most recent enrolment at DC. There has been a significant change over time, as Skilled Trades CR students are most recently associated with nearly three years between enrolment compared to one year in 2016. A similar change is evident in all of the categories, but is more pronounced for Skilled Trades CR students. The cause of this gap should be explored further, as it may indicate that students are entering the labour force before returning for further education.

SECTION V: STUDENT OUTCOMES

This section explores the academic outcomes of students based on having or not having prior postsecondary experience. Examining first semester grade point averages (GPA) of students within each of the program categories will provide insight into whether having prior postsecondary education has an impact on academic success. The data does not consider the extent to which prior postsecondary experience is related to the program. Also, subsequent research would be required to examine whether the differences between the four categories are statistically meaningful.

A. GRADE POINT AVERAGE - PRIOR POSTSECONDARY EXPERIENCE (SYSTEM OCAS)

Table 28 presents the aggregated GPA for students in first semester between Fall 2016 and Fall 2020. It further presents a comparison of students with and without prior postsecondary education at another college. It is important to note that students that were granted advanced block standing, and hence were enrolled in higher semesters, are not included in this table. GPA is presented on a five-point scale, where 5.0 is the highest GPA possible.

Table 28: System OCAS – GPA of First Semester Students with Prior Postsecondary Experience at Other Colleges by Program Category; Aggregate

Category	Has Prior Postsecondary	No Prior Postsecondary	Total
Skilled Trades CR	3.8 (108)	3.6 (1,448)	**1,556**
Non-Skilled Trades CR	3.4 (46)	3.1 (320)	**366**
Skilled Trades NCR	3.2 (308)	3.1 (3,490)	**3,798**
Non-Skilled Trades NCR	3.0 (1,966)	3.1 (18,811)	**20,777**
Total	**3.1 (2,405)**	**3.1 (23,511)**	**25,916**

Although there is a significant difference in the number of students with prior postsecondary education and those without, it is evident that students with prior postsecondary education at another college have a slightly higher average GPA in their first semester of study than those that do not, in all program categories except for Non-Skilled Trades NCR. The greatest difference in GPA is for Non-Skilled Trades CR programs. It should be noted that Skilled Trades CR students with prior postsecondary experience have the highest GPA across all categories.

Table 29 assesses trends by providing a comparison of GPAs for each category over the reporting period.

Table 29: System OCAS – GPA of First Semester Students with Prior Postsecondary Experience at Other Colleges by Program Category; Fall

Program Category	Status	2016	2017	2018	2019	2020
Skilled Trades CR	Prior PSE	3.7 (19)	3.8 (25)	3.8 (27)	3.7 (34)	4.1 (27)
	No Prior PSE	3.7 (315)	3.7 (382)	3.3 (360)	3.5 (329)	3.8 (226)
Non-Skilled Trades CR	Prior PSE	3.8 (7)	2.9 (6)	3.6 (7)	3.2 (12)	3.4 (16)
	No Prior PSE	3.5 (41)	2.9 (53)	3.2 (78)	3.1 (84)	3.0 (69)
Skilled Trades NCR	Prior PSE	2.9 (44)	3.6 (66)	3.2 (82)	3.2 (76)	2.9 (45)
	No Prior PSE	2.9 (746)	3.0 (771)	3.1 (769)	3.2 (736)	3.1 (577)
Non-Skilled Trades NCR	Prior PSE	3.0 (368)	3.1 (428)	3.0 (458)	3.0 (465)	3.0 (409)
	No Prior PSE	3.0 (3,904)	3.1 (4,487)	3.0 (4,509)	3.0 (4,304)	3.0 (3,687)

The GPA of Skilled Trades CR students with prior postsecondary education has increased over the reporting period. Conversely, the GPA of students in Skilled Trades NCR has declined and is slightly lower than those without prior postsecondary education.

B. GRADE POINT AVERAGE - DC TO DC (DC CSER)

While the previous subsection examined the GPAs of students with prior postsecondary education at the other 23 colleges, it is also important to consider the students with a history of enrolment at DC.

Table 30 compares the GPAs of first semester students with prior enrolment at DC to those without prior enrolment at DC.

Table 30: DC CSER – GPA of First Semester Students with Prior DC Experience by Program Category; Aggregate

Program Category	Has Prior DC Enrolment	No Prior DC Enrolment	Total
Skilled Trades CR	3.7 (555)	3.5 (1,051)	**1,606**
Non-Skilled Trades CR	3.1 (146)	3.2 (234)	**380**
Skilled Trades NCR	3.0 (1,244)	3.1 (2,764)	**4,008**
Non-Skilled Trades NCR	2.9 (7,311)	3.2 (14,795)	**22,106**
Total	**3.0 (8,591)**	**3.2 (18,844)**	**27,435**

Unlike the comparison of having prior postsecondary education at another college versus not, a history of enrolment at DC is not associated with a higher GPA for the Non-Skilled Trades CR and Skilled Trades NCR program categories. In fact, Skilled Trades CR programs is the only category in which GPA is higher for students who have a prior DC enrolment. This implies that, on an exploratory basis, within the given research study student dataset:

- students enrolling in DC Skilled Trades CR programs perform better on their first semester GPA if they have a prior postsecondary education;
- students enrolling in DC Non-Skilled Trades CR programs perform better on their first semester GPA if they have prior postsecondary education from a college other than DC;
- students enrolling in DC Skilled Trades NCR programs perform better on their first semester GPA if they have prior postsecondary education from a college other than DC;
- students enrolling in DC Non-Skilled Trades NCR programs perform worse on their first semester GPA if they have a prior postsecondary education.

Further research would be required to establish whether these findings are significant and replicable. Subsequent section examines the predictors of academic success in skilled trades programs.

SECTION VI: REGRESSION ANALYSIS

A. PREDICTORS OF ENROLMENT IN SKILLED TRADES PROGRAMS (DC CSER)

Regression analyses were conducted to investigate whether there were factors that contributed to respondents' decision to enrol in a Skilled Trades program. Socio-demographic variables were explored in the first analysis (gender, age and residency) with additional performance attributes (number of prior institutions, number of programs previously enrolled in, and most recent credential level) subsequently examined as possible factors that may predict students' decision.

Table 31 presents results of the analysis to identify factors that predict enrolment in Skilled Trades (CR & NCR) programs. It indicates that age (older), gender (males), and previous credential type (those of longer duration) are the predictors of students' interest in enrolling in Skilled Trades (CR & NCR) programs. Gender (male) is relatively the strongest predictor of enrolment in Skilled Trades programs followed by the credential type pursued in prior postsecondary experience (diploma).

Table 31: Regression Analysis – Predictors of Student Enrolment in Skilled Trades Programs

Variable	β	Standard Error	Significance
Age	.010	.004	.004**
Gender	.296	.030	.000**
Residency (domestic/international)	-.001	.007	.876
Number of Colleges Previously Attended	-.050	.066	.447
Number of Programs Previously Enrolled In	.045	.039	.252
Previous Credential Type	.093	.035	.008**
Prior PSE	-.019	.045	.676
Prior PSE – Same Occupational Cluster	.002	.045	.971
Constant	1.011		
Pseudo R^2	.174		
X^2	16.494; p <.001		
N	633		

**p < 0.01

B. PREDICTORS OF ACADEMIC SUCCESS IN SKILLED TRADES PROGRAMS (DC CSER)

The research study had initially hoped to investigate and identify the graduation predictors for students enrolled in skilled trades programs, particularly CR programs. However, given the non-availability of data for completion of prior postsecondary education and limited socio-demographic data, the academic success was re-oriented to academic success in the first semester of the program as defined by the GPA in the first semester. First semester GPA is a well-researched and established predictor of student graduation in research literature (Gershenfeld, Hood & Zhan, 2015).

Table 32 presents results of the analysis to identify factors that predict first semester performance of the students in Skilled Trade programs. The results indicate that students who are older, male, studying on international study permits, and those who have engaged in prior postsecondary education, had higher GPAs in the first semester of their enrolment in the Skilled Trades programs. Prior postsecondary experience is the strongest predictor of performance in a Skilled Trades program, followed by the gender (male).

Table 32: Regression Analysis – Predictors of Students' First Semester GPA

Variable	β	Standard Error	Significance
Age	.033	.004	.000**
Gender	-.147	.044	.001**
Residency (domestic/international)	.021	.008	.007**
Prior PSE	.207	.009	.035*
Constant	1.972		
Pseudo R^2	.025		
X^2	25.673; p <.001		
N	4,035		

*p < 0.05, **p < 0.01

While the model demonstrates that each of the variables included is a significant predictor of the first semester GPA, the overall pseudo R^2 for the model has a low value. The significant p values and the low R^2 indicate that likely additional variables need to be added to the model to generate a better model fit and increase the variance explained by the model.

CONCLUSIONS

KEY FINDINGS AND RECOMMENDATIONS

This study was unique in that it was the first systematic attempt to collate organized, longitudinal datasets for research in the areas of postsecondary skilled trades education in Ontario. Overall, this study was exploratory in nature and had a primary goal of determining whether there are any trends and patterns associated with students enrolled in a postsecondary skilled trades programs, particularly those related to the construction sector.

It is evident that while the majority of these students do not have prior postsecondary experience at other colleges, there is a large proportion that enroll in multiple programs at DC. Additionally, it appears that Skilled Trades CR programs appeal notably to students with prior postsecondary education in Technology-related programs.

Given these findings, the following are four key recommendations for further research:

EXPEND EFFORTS TO INCREASE GENDER DIVERSITY IN THE SKILLED TRADES

The analysis presented in the *Results and Discussion* section empirically confirms the anecdotal evidence that students in skilled trades programs tend to be males. This gender discrepancy is more pronounced in the Skilled Trades programs as compared to Non-Skilled Trades programs related to the construction sector.

The Ontario college sector has made significant efforts to build awareness and generate interest in the skilled trades among non-male populations, particularly, females. It is important that continued, extensive efforts be expended to raise the awareness of skilled trades educational and career opportunities in the non-traditional gender groups, particularly with regard to the construction sector.

PROMOTE SKILLED TRADES EDUCATIONAL OPPORTUNITIES TO INTERNATIONAL STUDENTS

The shortage of skilled trades labour in Ontario was a significant impetus in undertaking this research study. The results of the study indicate that there is an extremely low proportion of international students enrolled in the programs related to the construction sector, particularly in the skilled trades programs. This gap presents an enormous opportunity for the Ontario colleges to address the shortage of skilled labour in the Province by promoting skilled trades educational and career opportunities as part of international student recruitment, and raising the profile of these programs to address cultural or societal biases. It would be helpful as part of the international recruitment campaign to reinforce the academic rigor underlying certification in the skilled trades, and the robust employment opportunities in Canada. It is important to consider

international student preferences for longer duration programs, since they allow for longer duration work permits after graduating from the program.

EXPLORE CREDIT TRANSFER OPPORTUNITIES FOR STUDENTS WITH PRIOR POSTSECONDARY EXPERIENCE ENROLLED IN SKILLED TRADES PROGRAMS

The longitudinal descriptive analysis in this study reinforced anecdotal classroom observations that students enrolled in the Skilled Trades CR programs are younger than those in the other three program categories, and that over the five-year period of 2016 to 2020, their median age has declined from 24 years to 20 years. However, while the median age of the students in Skilled Trades CR programs has declined over the five years, their proportion engaging in prior postsecondary has almost doubled from 3.9% to 8.4% over the same period. These proportions only include prior postsecondary at colleges other than DC and if they were to include the prior postsecondary at DC, they would likely be even higher. The increase in the prior postsecondary experience coupled with the finding that significant proportion of those are taking place from a diploma program to diploma program, provides indirect but significant credence that there may be opportunities for credit transfer, at least for General Electives courses.

Limitations of how the CT flag is currently deployed and recorded on enrolment files precluded the opportunity to fully investigate the levels of affinity between prior postsecondary programs and subsequent interest in skilled trades programs. The limited analysis, however, did reveal a higher proportion of interest from students in Technology related programs to subsequently enroll in Skilled Trades CR programs.

EXPLORE PATHWAY OPPORTUNITIES BETWEEN TRADITIONAL TECHNOLOGY PROGRAMS AND SKILLED TRADES PROGRAMS

The results of the study indicate that a very small proportion of students enrolled in Skilled Trades programs tend to have prior postsecondary experience as compared to students enrolled in Non-Skilled Trades programs. However, almost half of the students enrolled in the Skilled Trades CR programs at DC who had prior postsecondary experience, had engaged with a postsecondary program associated with the Technology occupational cluster. This indicates significant potential for acknowledging common competencies and transferable skills between the traditional Technology programs and the Skilled Trades programs related to construction sector. It offers an opportunity for further exploration to determine any potential pathways. In particular, students who had prior enrolment in Electronics and Mechanical programs were subsequently interested in enrolling in programs related to the construction sector.

SUPPORT ACADEMIC SUCCESS OF WOMEN IN SKILLED TRADES PROGRAMS

The regression results indicate that male students in Skilled Trades (CR & NCR) programs have higher academic performance than females. It is important to ensure

that adequate teaching and learning supports, as well as socio-economic supports, such as, childcare, mentors, and social supports, are available to women who participate in Skilled Trades CR programs and aspire to eventually undertake careers in skilled trades occupations.

Also, Skilled Trades CR programs are generally perceived to be an appealing domain for young, male-centric population. The regression results indicate that older students, especially students who have engaged in prior postsecondary experience, are better situated to excel in these skilled trades programs.

LIMITATIONS AND FUTURE RESEARCH

EXPAND THE STUDY POPULATION TO INCLUDE MULTIPLE INSTITUTIONS

This research study was unique and first-of-its-kind in Ontario in its attempt to undertake a systematic investigation into attributes and enrolment patterns of the students enrolled in skilled trades programs. However, the base population investigated in this study was limited to the students enrolled at DC over the 2016 to 2020 period. While DC does offer a variety of skilled trades programs, expanding the study to include multiple institutions will allow a greater pool of skilled trades programs to be included along with a larger sample size so the conclusions can be generalized to an even greater student population.

Exploratory studies are an important and critical step in preliminary analysis of the current environment, seeking insights into historical patterns, and allowing for anomalies to be identified. Exploratory investigations, however, constitute only the first step in developing fuller and more reliable framework of findings that can support action planning. The findings from this exploratory research should be followed by well-structured empirical investigations that compare the attributes and outcomes of the four program categories identified.

EXPAND VERIFIABLE PRIOR POSTSECONDARY DATA COLLECTION AND RECORD-KEEPING THROUGH COLLABORATION BETWEEN OCAS, OUAC, ONCAT AND POSTSECONDARY INSTITUTIONS IN ONTARIO

This study was able to recourse reliable and validated data for prior postsecondary experience from OCAS. However, given the nature of reporting, this valid information was limited to prior postsecondary experience at the colleges in Ontario.

The study attempted to further enhance the prior postsecondary information with data from self-declared prior postsecondary experience field on the OCAS application. While the additional prior postsecondary information derived from this source included universities, private and career colleges, and institutions outside of Ontario, the information is unfortunately neither complete nor fully verifiable. OCAS applications afford an important opportunity to collect more complete and verifiable prior education data; it is recommended that greater collaboration between OCAS, OUAC, ONCAT and

the postsecondary institutions in Ontario can yield further significant results in collecting and usefully analyzing the information to support action planning.

CREATE A RELIABLE, INTEGRATED DATA REPOSITORY FOR SOCIO-DEMOGRAPHIC DATA TO INCLUDE IN FUTURE SKILLED TRADES RESEARCH

The research study had initially intended to include important socio-demographic attributes such as Indigenous identity and First Generation status. However, in the course of data collection it was determined that there is no comprehensive record that reliably and consistently identifies students for these attributes. There are also other key attributes that this study would benefit from including, such as ability or socio-economic class.

DC currently collects data through multiple channels, such as OCAS applications, EDI surveys, and self-identification in-person. Currently, DC is exploring ways of integrating the data from these various sources and centralizing data recording in the Banner SIS to ensure reliable reporting. Further research will again explore the inclusion of socio-demographic variables once the databases are fully and reliably established.

IMPROVE IDENTIFICATION AND RECORDING OF CREDIT TRANSFERS FOR PRIOR POSTSECONDARY EXPERIENCES

The ability to investigate program affinity in prior postsecondary education for skilled trades students was severely limited in this study due to the deployment of credit transfer as a permanent marker on the student record for the duration of their time at the given institution. Ontario's colleges use CSER specifications to assign and report the CT flag for a student who has been awarded credit transfer. Unfortunately, once awarded, a CT flag is a permanent identifier on the student record irrespective of the subsequent programs in which they may enroll, and whether they receive any further prior learning credit for those programs. This creates significant difficulty in ascertaining whether a student has received relevant credit in a program in any given academic year or semester and adversely impacts the ability to analyze and report on student mobility. Ensuring that each credit transfer for students can be uniquely identified to the given program and attributed to a given academic year or semester would significantly improve the quality of reporting.

Furthermore, additional data relevant to prior postsecondary experiences should also be recorded. Most institutions can report the courses that were leveraged in the awarding of a credit, but not additional details, such as credit counts awarded for specific programs, number of times credit transfer applied, record of denied credits, particular pathway leverage if any, type of pathways, and type of institution credited (college or university).

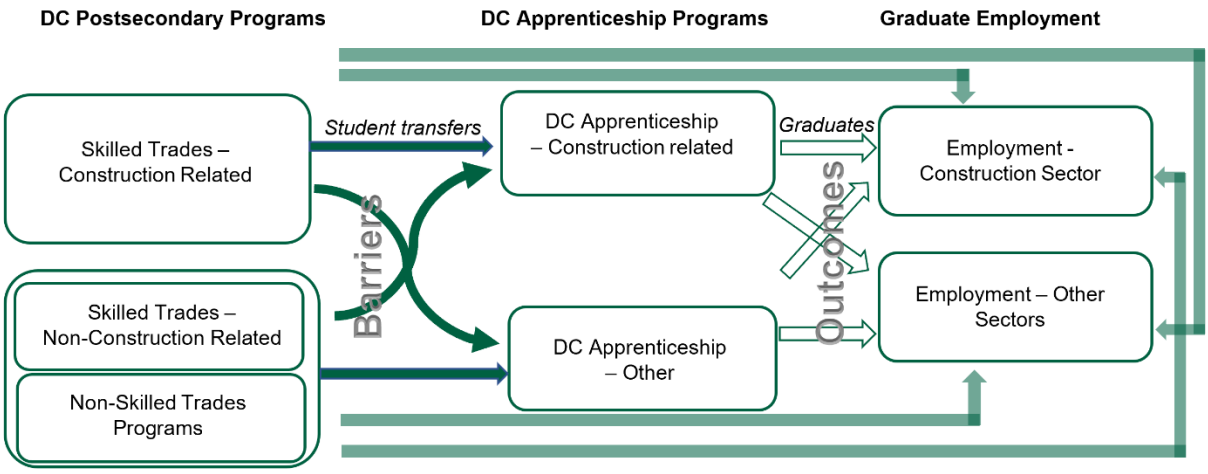
EXPLORE PATHWAYS BETWEEN SKILLED TRADES POSTSECONDARY EDUCATION AND APPRENTICESHIP TRAINING

There is significant value in undertaking efforts to map the curriculum of skilled trades postsecondary programs to that of relevant apprenticeship programs. DC has taken the initiative to formalize apprenticeship programs as Ontario College Certificates to support the modernization of the skilled trades and apprenticeship system, and enable the Province's economic recovery. This would serve as a key step in facilitating student transfers between postsecondary education and apprenticeship training. DC has commenced this process with the following 10 programs:

1. Culinary Skills – Cook II Apprenticeship, Ontario College Certificate, MTCU Code 43107, Trade# 415A
2. Early Childhood Assistant - Apprenticeship, Ontario College Certificate, MTCU Code 41211, Trade# 620C
3. Electrical Techniques – Construction and Maintenance Apprenticeship, Ontario College Certificate, MTCU Code 45613, Trade# 309A
4. Electrical Techniques – Industrial Electrician Apprenticeship, Ontario College Certificate, MTCU Code 45613, Trade# 442A
5. Manufacturing Techniques – Millwright Apprenticeship, Ontario College Certificate, MTCU Code 47000, Trade# 433A
6. Mechanical Techniques – Elevating Devices Mechanic Apprenticeship, Ontario College Certificate, MTCU Code 41007, Trade# 636E
7. Mechanical Techniques – Steamfitting Apprenticeship, Ontario College Certificate, MTCU Code 41007, Trade# 307A
8. Motive Power Fundamentals – Automotive Service Apprenticeship, Ontario College Certificate, MTCU Code 46405, Trade# 310S
9. Plumbing Techniques - Apprenticeship, Ontario College Certificate, MTCU Code 41010, Trade# 306A
10. Welding Techniques Apprenticeship, Ontario College Certificate, MTCU Code 44900, Trade# 456A

Building an understanding of the pathways that students follow to enrol in skilled trades postsecondary programs is only a preliminary step in understanding student mobility. It is also important to explore student pathways into and out of apprenticeship programs. In particular, the next stage of research is recommended to explore student interest in apprenticeship training programs, access to apprenticeship opportunities for the graduates of Skilled Trades postsecondary programs, the relative success of students enrolling in apprenticeship training after a postsecondary experience, and the employment outcomes for graduates in skilled trades postsecondary programs. Figure 2 provides an overview of the proposed investigation into student mobility.

Figure 2: Student Pathways from Postsecondary to Apprenticeship to Employment



The future proposed study would represent a first-of-its-kind exploration into student transfers from postsecondary to apprenticeship training programs in the construction sector in Ontario. As Figure 1 illustrates, the potential pathways are complex. The project would also aspire to model characteristics of successful transfer students using logistic regression, if data adequacy and statistical assumptions are met. Predictors of transfer student success in apprenticeship training have not been evaluated to date in Ontario and would benefit from further research.

The following research questions are recommended for a future study:

1. Postsecondary student interest in construction sector apprenticeship training programs at DC
    a. What is the interest among the graduates of postsecondary skilled trades programs in pursuing apprenticeship training in the construction sector?
    b. What is the interest among the graduates of non-skilled trades postsecondary programs in pursuing apprenticeship training in the construction sector?

2. Transfer experience
    a. What barriers limit postsecondary students' ability to successfully enrol in apprenticeship training in the construction sector?
    b. What supports enable postsecondary students to successfully transfer to apprenticeship training in the construction sector?
    c. Explore the aspects of EDI in apprenticeship training. Are the various equity seeking groups represented in apprenticeship training programs? What impact do socio-demographic or diversity markers (for example, gender, ability, age or socio-economic class) have on access to apprenticeship training?

3. Graduate outcomes
    a. What are the differences in the in-class completion rates (measured by graduation) for apprentices with prior education in a postsecondary skilled trades program as compared to apprentices who do not have prior postsecondary experience? Are these completion rates different for the students with partial postsecondary experience as compared to students who graduated from the postsecondary programs? Are the in-class completion rates different for apprenticeship students whose prior postsecondary education is in a skilled trades related area?
    b. Investigate the graduate outcomes, including employment outcomes, for graduates from postsecondary skilled trades programs.
        i. Has the College's skilled trades related postsecondary programming resulted in the increased availability of skilled workers over the last few years? What are the longitudinal graduation rate trends for students enrolled in postsecondary skilled trades programs?
        ii. Are graduates of the skilled trades postsecondary program able to find relevant employment opportunities? What are the employment outcomes, such as overall employment, full-time employment, employment in a related field for graduates of the postsecondary skilled trades programs?

APPENDICES

APPENDIX A: SKILLED TRADES SECTORS

Construction tradespersons are active in building, maintaining and renovating residential, commercial, industrial and public infrastructure projects (e.g., General Carpenter, Ironworker, Electrician, Plumber and Tower Crane Operator).

Transportation (motive power) tradespersons fix, repair, or maintain vehicle engines and bodies (e.g., Agricultural Equipment Technician, Automotive Service Technician, and Heavy Duty Equipment technicians).

Manufacturing (industrial) tradespersons are involved in precision machining, tooling trades, mould making and millwrighting. (e.g., Welder, Tool & Die Makers and Industrial Mechanic Millwright)

Services tradespersons work directly with the public by offering their services to customers (e.g., landscape horticulturalists, cooks, and hairstylists).

(Government of Ontario, 2021a).

APPENDIX B: CATEGORIZATION OF DC PROGRAMS INCLUDED IN THE RESEARCH STUDY

Skilled Trades Construction Related (CR)		
MTCU Code	**MTCU Title**	**Cluster**
Certificates		
41007	Mechanical Techniques	Technology
44900	Welding Techniques	
45500	Heating, Air Conditioning and Refrigeration Techniques	
45501	Gas Technician 2	
45613	Electrical Techniques	
48200	Construction Trades Techniques	
48202	Construction & Hoisting Techniques	
Diplomas		
55613	Electrical Engineering Technician	Technology
57600	Carpentry - Renovation	
58100	Building Construction Technician	

Skilled Trades Non-Construction Related (NCR)		
MTCU Code	**MTCU Title**	**Cluster**
Certificates		
43107	Chef Training	Business
44702	Pre-Technology	Applied Arts
49100	Stationary Engineering	Technology
Diplomas		
51211	Early Childhood Education	Applied Arts
51641	Developmental Services Worker	
53905	Landscape and Horticultural Technician	
52205	Special Events Planning - Destination Tourism	Business
53107	Culinary Management	
52711	Artisan Agriculture	Technology
54900	Welding Engineering Technician	
55203	Electronics Engineering Technician	
55300	Mechanical Engineering Technician - Tool and Machine Design	
55503	Energy Systems Engineering Technician	
56405	Motive Power Technician	
59100	Stationary Engineering	
Advanced Diplomas		
60701	Child and Youth Worker	Applied Arts
65203	Electronics Engineering Technology	Technology
Graduate Certificates		
72205	Event Management	Business
73002	Information Systems Security	
73106	Advanced Baking and Pastry Arts	

Non-Skilled Trades Construction Related (CR)		
MTCU Code	**MTCU Title**	**Cluster**
Diplomas		
50600	Architectural Technician	Technology
51003	Civil Engineering Technician	
Advanced Diplomas		
60600	Architectural Technology	Technology
61003	Civil Engineering Technology	

Non-Skilled Trades Non-Construction Related (NCR)		
MTCU Code	**MTCU Title**	**Cluster**
Certificates		
40719	Human Services Foundation	Applied Arts
41598	Pre-Health Sciences Pathway to Certificates and Diplomas	
41599	Pre-Health Sciences Pathway to Advanced Diplomas and Degrees	
41800	Art Fundamentals	
41903	Media Fundamentals	
41904	Pre-Media (Media and Communications Fundamental)	
43015	Emergency Services Fundamentals	
44700	General Arts and Science - One-Year	
59650	Community Integration Through Co-Operative Education	
40208	Business Fundamentals	Business
42305	Court Reporting - Stenomask	
42313	Office Administration - General	
42320	Dental Office Administration	
43200	Hospitality and Tourism	
41469	Personal Support Worker	Health
41603	Animal Care	
41629	Dental Assistant (Level I And Ii)	
40505	Computer Foundations	Technology
Diplomas		
50721	Social Service Worker	Applied Arts
50805	Library and Information Technician	
51827	Video Production	
51830	Digital Photography and Imaging	
51831	Photography	
51901	Animation - Television	
51903	Broadcasting - Radio	
51914	Music Business Administration	
52005	Journalism - Web and Print	
52006	Journalism - Print and Broadcasting	
52100	Advertising	
52203	Recreation Leadership	

52209	Fitness and Health Promotion	
52211	Sports Administration	
52937	Cosmetic Techniques	
53007	Law and Security Administration	
53008	Police Foundations	
53401	Esthetician	
54701	General Arts and Science - Diploma	
50721	Social Service Worker	
59403	Media Arts	
50100	Business - Accounting	Business
50104	Accounting and Payroll	
50200	Business	
50201	Business - Finance	
50223	Business - Human Resources	
50503	Computer Programmer	
50513	Internet Website Development	
52306	Office Administration - Legal	
52307	Office Administration Real Estate	
52308	Office Administration - Medical	
52316	Office Administration - Executive	
52613	Court and Tribunal Agent	
52803	Insurance	
52900	Business - Marketing	
53200	Hotel and Restaurant Management	
58900	Business - Materials Management	
51407	Practical Nursing	Health
51502	Occupational/ Physiotherapy	
51634	9-1-1 Emergency and Call Centre Communications	
51637	Paramedic	
50501	Instrumentation Engineering Technician	Technology
50505	Computer Systems Technician	
51007	Mechanical Engineering Technician	
51302	Chemical Laboratory Technician	
52705	Water and Waste Water Technician	
53011	Fire and Life Safety Systems Technician	
Advanced Diplomas		
60243	Public Relations	Applied Arts
61800	Fine Arts and Crafts - Advanced	
61820	Graphic Design	
61900	Game Development	
61901	Animation	
61914	Music Business Management	
62006	Journalism - Print and Broadcasting	

62100	Advertising	
62211	Sport Management	
69403	Contemporary Media Production	
60100	Business Administration - Accounting	Business
60201	Business Administration - Finance	
60204	Business Administration - Professional Golf Management	
60223	Business Administration - Human Resources Management	
60503	Computer Programmer Analyst	
62611	Legal Administration	
62900	Business Administration - Marketing	
68900	Materials Management	
61618	Massage Therapy	Health
61628	Dental Hygiene (Direct Entry)	
60505	Computer Systems Technology	Technology
61007	Mechanical Engineering Technology	
61021	Electro-Mechanical Engineering Technology	
61301	Chemical Engineering Technology	
61302	Chemical Technology - Bioengineering	
61303	Biomedical Engineering Technology	
61304	Biotechnology Technologist	
62700	Resources/Environmental Technology	
Graduate Certificates		
70705	Penology and Youth	Applied Arts
70708	Mediation	
70711	Autism and Behavioural Science	
70717	Research Analyst	
70739	Victimology	
70902	Addictions: Treatment and Prevention	
71496	Activation Coordination in Gerontology	
72104	Advertising-Account Management	
72211	Sport Business Management	
72616	Library Reference and Information Management	
73016	Advanced Investigations	
79402	Advanced Television and Film	
79406	Video Effects	
70202	International Business Management	Business
70207	Project Management	
70223	Human Resources Management	
70502	Information Systems Business Analyst	
72614	Court and Administrative Tribunal Agent	
71423	Registered Nurse - Critical Care Nursing	Health
71506	Communicative Disorders Assistant	
71637	Advanced Care Paramedic	

Baccalaureate Degrees		
80720	Bachelor of Behavioural Science	Applied Arts
81646	Honours Bachelor of Health Care Technology Management	Health

REFERENCES

Ahmed, N. (2010). *National Apprenticeship Survey 2007: Labour Market Outcomes of Canada Apprentices*. Canadian Council of Directors of Apprenticeship and Human Resources and Skills Development Canada. http://www.red-seal.ca/images/NAS_LM_Conditions_En.pdf

Akyeampong, E. (1991). *Apprentices: Graduate and dropout labour market performances*. Statistics Canada Catalogue no. 75–001-X.

Arrowsmith, E. (2017). *Apprenticeship in Canada: Apprentice attitudes toward learning and examination*. Canadian Apprenticeship Forum. https://caf-fca.org/wp-content/uploads/2017/07/Member11-Exam-Supports-2.pdf

Arrowsmith, E. (2018). *Apprenticeship in Canada: Research insights based on data, trends and observations.* Canadian Apprenticeship Forum. https://caf-fca.org/wp-content/uploads/2018/06/Apprenticeship-in-Canada_2018.pdf

Barnetson, B. (2018). *Canada's labour market training system.* Athabasca University Press. https://read.aupress.ca/read/canada-s-labour-market-training-system/section/050a06a5-ce66-4a3a-a826-fe0952a70167

Boothby, D., & Drewes, T. (2010). *Returns to apprenticeship in Canada*. (Working paper no. 70.) Canadian Labour Market and Skills Researcher Network. http://www.clsrn.econ.ubc.ca/workingpapers/CLSRN%20Working%20Paper%20no.%2070%20-%20Boothby%20and%20Drewes.pdf

Brydon, R., & Dachis, B. (2013). *Access denied: The effect of apprenticeship restrictions in skilled trades.* C.D. Howe Institute. https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed/Commentary_380_0.pdf

BuildForce Canada. (2020a). *Canada's resilient construction and maintenance industry will require more than 300,000 new workers by 2029*. https://www.buildforce.ca/en/blog/canadas-resilient-construction-and-maintenance-industry-will-require-more-300000-new-workers

BuildForce Canada. (2020b). *Ontario will need to recruit 100,000 new construction workers over 10 years to keep pace with increased demand and retirements.* https://www.buildforce.ca/en/node/11852

BuildForce Canada. (2021). *Canada's construction industry rebounds post-pandemic, with more muted growth to come.* https://www.buildforce.ca/en/node/12016

Cadieux, B. (2010). *National apprenticeship survey 2007: Factors influencing completion of apprenticeship.* Canadian Council of Directors of Apprenticeship. https://www.sceau-rouge.ca/images/NAS_Completion_En.pdf

Campbell, N. (2010). *The determinants of low (and slow) completions in the Canadian apprenticeship system.* (Master's thesis, École des Hautes Études Commerciales). Canadian Research Data Centre Network.

Canadian Apprenticeship Forum. (n.d.). *What is apprenticeship?* https://caf-fca.org/apprenticeship-101/what-is-apprenticeship/

Canadian Apprenticeship Forum. (2004). *Accessing and completing apprenticeship training in Canada: Perceptions of barriers*. (Consultation report). https://www.caf-fca.org/wp-content/uploads/2017/07/Accessing-and-Completing-Apprenticeship-Training-in-Canada.pdf

Canadian Apprenticeship Forum. (2005). *Skilled trades and apprenticeship awareness and perception study.* https://caf-fca.org/wp-content/uploads/2017/07/Highlights-of-the-Skilled-Trades-and-Awareness-and-Perception-Study.pdf

Canadian Apprenticeship Forum. (2021). *Apprentice demand in Red Seal trades: A 2021 national labour market information report*. https://caf-fca.org/wp-content/uploads/2021/05/CAF_Report_LMI-2021_EN_National_-FINAL-1.pdf

Carey, D. (2014). *Overcoming skills shortages in Canada*. (Working Paper, No. 1143). OECD Publishing. https://doi.org/10.1787/5jz123fgkxjl-en

Chatoor, K. & Kaufman, A. (2020). *The journey of Ontario apprentices: From high school to the workforce*. Higher Education Quality Council of Ontario. https://heqco.ca/wp-content/uploads/2020/11/Formatted_Journey-of-Ontario-Apprentices-FINAL.pdf

The Conference Board of Canada. (2002).*Solving the skills trades shortage.* https://www.conferenceboard.ca/docs/default-source/educ-public/Skilled_trades.pdf?sfvrsn=0

Crocker, R., Pepin, C., Hurrell, K., Wald, S., Wiebe, J., Wong, G., & Ahmed, N. (2014). *Apprenticeship completion, certification and outcomes.* Red Seal Excellence Program. http://www.red-seal.ca/docms/report_outcomes2014_eng.pdf

Crocker, R. (2011). *Understanding pathways to the skilled trades*. (Unpublished Report). Human Resources and Skills Development Canada.

Desjardins, L., & Paquin, N. (2010). *Registered apprentices: The cohorts of 1994 and 1995, one decade later*. (Catalogue no.81-595-M, no.080). Statistics Canada. https://www150.statcan.gc.ca/n1/pub/81-595-m/81-595-m2010080-eng.htm

Dijkema, B. (2018). *Skilled trades – transition briefing: An effective skilled trades strategy for Ontario*. Ontario 360. https://wp-a52btu2v90.pairsite.com/30-30/skilled-trades-transition-briefing/

Dostie, B. (201)0. *A competing risks analysis of the determinants of low completion rates in the Canadian apprenticeship system*. (Canadian Labour Market and Skills

Research Network Working Paper No. 67). Canadian Labour Market and Skills Research Network. https://www.researchgate.net/publication/254453063_A_Competing_Risks_Analysis_of_the_Determinants_of_Low_Completion_Rates_in_the_Canadian_Apprenticeship_System

Drummond, D. & Kachuck Rosenbluth, E. (2015). *Competencies can bridge the interests of business and universities.* Education Policy Research Initiative. https://ruor.uottawa.ca/bitstream/10393/33200/4/EPRI%20Working%20Paper%202015-02.pdf.

Duessing, M. (2015). *Attitudes and perceptions of Canadian youth towards careers in the trades: Results from the 2012 programme for international student assessment (PISA).* https://saskapprenticeship.ca/wp-content/uploads/2020/08/Attitudes-and-perceptions-of-Canadian-youth-towards-careers-in-the-trades_EN_Final-3.pdf

Ericksen, J., & Palladino-Schultheiss, D. (2009). *Women pursuing careers in trades and construction*. Cleveland State University. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.973.1367&rep=rep1&type=pdf

Finnie, R., Dubois, M., & Miyairi, M. (2021). *How much do they make? New evidence on the early career earnings of trade certificate holders*. Education Policy Research Initiative and Labour Market Information Council. https://lmic-cimt.ca/trade-earnings-report/

Frank, K., and E. Jovic. (2017). *National Apprenticeship Survey: Canada overview report, 2015*. Catalogue no. 81-598-X. Ottawa: Statistics Canada. https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2019008-eng.htm

Frank, K. & Frenette, M. (2019). *How do women in male-dominated apprenticeships fare in the labour market?* Statistics Canada. https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2019008-eng.htm

Gallagher, P & Kitching, A. (2003). *Canada's community colleges and alternation*. McGill-Queen's University Press.

Gershenfeld, Susan & Hood, Denice & Zhan, Min. (2015). *The Role of First-Semester GPA in Predicting Graduation Rates of Underrepresented Students*. Journal of College Student Retention: Research, Theory & Practice.

Government of Canada. (2014). *Jobs report: The state of the Canadian labour market. Department of Finance Canada.* https://www.budget.gc.ca/2014/docs/jobs-emplois/pdf/jobs-emplois-eng.pdf

Government of Canada. (2021). *Government launches Calls for Proposals to remove barriers and get more apprentices certified in the skilled trades.* Employment and Social Development Canada. https://www.canada.ca/en/employment-social-development/news/2021/08/apprenticeship-serviceutip-cfp-launch-ibew-local-804-utip-news-release.html

Government of Ontario. (n.d.). *Hire an apprentice.* https://www.ontario.ca/page/hire-apprentice

Government of Ontario. (2015). *Specialist high skills major.* http://www.edu.gov.on.ca/morestudentsuccess/shsm_fact_sheet.pdf

Government of Ontario. (2018). *Ontario improving apprenticeship system to prepare skilled workforce for in-demand jobs*. News Release. https://news.ontario.ca/en/release/48101/ontario-improving-apprenticeship-system-to-prepare-skilled-workforce-for-in-demand-jobs

Government of Ontario. (2019). *Building a skilled workforce with portable skills sets.* https://news.ontario.ca/en/backgrounder/52463/building-a-skilled-workforce-with-portable-skill-sets

Government of Ontario. (2021a). *Skilled trades*. https://www.ontario.ca/page/skilled-trades

Government of Ontario. (2021b). *Building opportunities in the Skilled Trades Act, 2021, S.O. 2021, c. 28 - Bill 288.* https://www.ontario.ca/laws/statute/s21028#top

Gunderson, M., and H. Krashinsky. (2012). *Returns to apprenticeship: Analysis based on the 2006 Census*. (Working Paper no. 99). Canadian Labour Market and Skills Researcher Network.

Green, C., & Stitt-Gohdes, W. (1997). *Factors than influence women's choices to work in the trades*. Human Sciences Press, Inc.

Green, J., Melnick, A., Pariser, A. (2021). *Supporting an accessible and inclusive skilled trades and apprenticeship system in Ontario*. https://www.ontario.ca/document/supporting-accessible-and-inclusive-skilled-trades-and-apprenticeship-system-ontario

Haan, M., Hyeongsuk, J., Langevin, M., Lebel, A. (2020). *Factors associated with the completion of apprenticeship training in Canada*. Statistics Canada. https://www150.statcan.gc.ca/n1/en/pub/75-006-x/2020001/article/00008-eng.pdf?st=eNhEM4f8

Holmes, A., & Hjartarson, J. (2013). *Caution work ahead.* Ontario Chamber of Commerce. https://occ.ca/wp-content/uploads/CautionWorkAhead-1.pdf

Jean-Louis, M. (2017). *An apprenticeship skills agenda – Executive summary.* https://rescon.com/reports/files/OSTA-Report-An-Apprenticeship-Skills-Agenda-Report.pdf

Lane, J., & Griffiths, J. (2015). *Building blocks: Modular credentials for Canada's trades*. Canada West Foundation. http://cwf.ca/wp-content/uploads/2016/01/HCP_BuildingBlocks_Report_4JAN2016_1.pdf

Laporte, C., & Mueller, R. (2011). *The Completion Behaviour of Registered Apprentices: Who Continues, Who Quits, and Who Completes Programs?(* Analytical Studies Branch Research Paper Series, no. 333). Statistics Canada. https://www150.statcan.gc.ca/n1/pub/11f0019m/11f0019m2011333-eng.htm

Laporte, C., & Mueller, R. (2012). *Certification, completion, and the wages of Canadian registered apprentices*. Statistics Canada. https://www150.statcan.gc.ca/n1/en/pub/11f0019m/11f0019m2012345-eng.pdf?st=461aCD-y

Laryea, S.A., & Medu. K. (2010). *National Apprenticeship Survey, 2007: Participation of Women, Immigrants and Aboriginal People in Apprenticeship Programs*. Human Resources and Skills Development Canada. https://www.red-seal.ca/docms/nas_participation_eng.pdf

Lefebvre, R., Simonova, E., & Wang, L. (2012). *Issue in focus: Labour shortages in skilled trades – The best guesstimate?* http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.663.2227&rep=rep1&type=pdf

Ménard, M., Menezes, F., Chan, C.K.Y., & Walker, M. (2008). *National Apprenticeship Survey: Canada Overview Report, 2007*. Statistics Canada. https://www150.statcan.gc.ca/n1/en/pub/81-598-x/81-598-x2008001-eng.pdf?st=8sLS7l25

Ministry of Advanced Education and Skills Training. (2021). *Skilled trades certification in British Columbia*. https://engage.gov.bc.ca/app/uploads/sites/672/2021/06/Business-Case-Skilled-Trades-Certification.pdf

Ontario Colleges of Trades. (2020). *Trades in Ontario*. https://www.collegeoftrades.ca/trades-in-ontario

Ontario Ministry of Training, Colleges and Universities. (2015). *Goal path description for practitioners and learners – Apprenticeship.* http://tcu.gov.on.ca/eng/eopg/publications/OALCF_GPD_Apprenticeship_Feb_15.pdf

Pyper, W. (2008). *Skilled trades employment.* Statistics Canada. https://www150.statcan.gc.ca/n1/en/pub/75-001-x/2008110/pdf/10710-eng.pdf?st=sk72WogP

Schuetze, H. G. (2003). *Alternation Education and Training in Canada.* Montreal, Quebec: McGill-Queen's University Press.

Sharpe, A., & Gibson, J. (2005). *The apprenticeship system in Canada: Trends and issues*. Centre for the Study of Living Standards.

Spence, R. (2012). *Skilled trades talent shortage is next crisis for Canadian business*. Financial Post. http://business.financialpost.com/2012/09/03/skilled-trades-talent-shortageis-next-crisis-for-canadian-businesses/

Statistics Canada. (2016). *Census of population*. (Catalogue no. 98-400-X2016295). Statistics Canada.

Statistics Canada. (2021). *Number of apprenticeship program registrations*. (Table: 37-10-0023-01). Statistics Canada.

Statistics Canada. (2017*a)*. *Census in Brief: Does education pay? A comparison of earnings by level of education in Canada and its provinces and territories*. (Catalogue no. 98-200-X2016024). Statistics Canada.

Statistics Canada. (2020a). *New registrations in apprenticeship programs in Canada falls in 2019, led by sharp declines in Alberta*. https://www150.statcan.gc.ca/n1/daily-quotidien/201209/dq201209c-eng.htm

Statistics Canada. (2020b). *Study: Completing apprenticeship training in Canada*. https://www150.statcan.gc.ca/n1/daily-quotidien/201209/dq201209a-eng.htm

Stuckey, J., & Munro, D. (2013). *The need to make skills work: The cost of Ontario's skills gap*. The Conference Board of Canada. https://www.conferenceboard.ca/e-library/abstract.aspx?did=5563

Taylor, A. (2003) *The context of school-work transition in Canada*. (Work and Learning Network Working Paper #42.)

Wall, D. (2021). *New Skilled Trades Ontario to replace College of Trades*. Construction Connect Canada. https://canada.constructconnect.com/dcn/news/government/2021/05/new-skilled-trades-ontario-to-replace-college-of-trades